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# RYAN GULCH FIRE SALVAGE ENVIRONMENTAL ASSESSMENT

JANUARY 2001
Montana Department of Natural Resources and Conservation
Missoula Unit Office

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## CHECKLIST ENVIRONMENTAL ASSESSMENT

**Project Name:** Ryan Gulch Salvage **Proposed Implementation Date:** February 2001.
**Proponent:** Department of Natural Resources and Conservation, Southwestern Land Office, Missoula Unit.
**Type and Purpose of Action:** The Department of Natural Resources and Conservation proposes to salvage harvest between 0.4 and 0.6 million board feet (MMBF) of sawtimber damaged and killed by wild fire. Of this approximately 0.1 million-board feet (MMBF) is small diameter, green lodge pole pine, which was damaged and is expected to die. The purpose of the proposed action is to generate revenue for the Common School (CS) trust grant. There is an action and no action alternative. The action alternative: salvage would occur on approximately 200 acres. No new roads are proposed. Up to one mile of road would be ripped, seeded and water barriers constructed. The lands involved in this proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions such as for public schools, state colleges and universities, and other specific state institutions such as the School for the Deaf and Blind (Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners and the Department of Natural Resources and Conservation (DNRC) are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Section 77-1-202, MCA). On May 30, 1996 the DNRC released the Record of Decision on the State Forest Management Plan (The Plan). The Land Board approved the Plan's implementation on June 17, 1996. The Plan outlines the management philosophy of DNRC in the management of State Forested Trust Lands, as well as sets out the specific Resource Management Standards for ten resource categories. The Department will manage the lands involved in this project according to the philosophy and standards in the Plan, which states:

> Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-tem revenue stream…In the foreseeable future, timber management will continue to be our primary source of revenue and our primary tool; for achieving biodiversity objectives.

**Location:** Portions of: Section 36, T12N, R16W and Sections 4 and 16, T11N, R15W, PMM.
**County:** Missoula and Granite

| I. PROJECT DEVELOPMENT | |
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| 1.PUBLIC INVOLVEMENT, AGENCIES, GROUPS OR INDIVIDUALS CONTACTED: Provide a brief chronology of the scoping and ongoing involvement for this project. | Comments from the general public, interest groups and agency specialists were solicited in September of 2000. Newspaper ads were run in the Missoulian, on September 3 and 10 of 2000. Scoping letters were mailed to 24 individuals and organizations; (a list of the organizations/individuals contacted is available in the project file). Written comments were received from the following organizations: Alliance for the Wild Rockies, Missoula; Ecology Center, Missoula; Montana Fish, Wildlife and Parks, Missoula; and Tricon Timber, St. Regis. The following resource specialists were involved in the project design, assessment of potential impacts, and development of mitigation measures: Rosemary Leach Wildlife Biologist, Southwest Land Office (SWLO), Jeff Collins - Soil Scientist, Forest Management Bureau (FMB), George Mathieus - Hydrologist, FMB, DNRC, Missoula; Pat Rennie - Archeologist, Agriculture and Grazing Management Bureau, DNRC, Helena. |
| 2.OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED: | Plum Creek Timber Co. - Reciprocal Road Use Permit<br>Other Private Land owners - Road Use Easements |

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| 3. ALTERNATIVES CONSIDERED: | (1) Action Alternative: Salvage harvest between 0.4 and 0.6 million board feet (MMBF) of sawtimber damaged or killed by wild fire, from approximately 200 acres. Of this, approximately 0.1 million-board feet (MMBF) is small diameter, green lodge pole pine, which was damaged and is expected to die. Improve and maintain approximately 10.5 miles of road. Rip, seed and construct water barriers on up to one mile of road. This alternative is expected to provide $60,000 to $90,000 net revenue to the Common School Trust (this includes collections for Forest Improvements). See "Economics" report attached.<br>*(2)* No Action Alternative: No land management activities would be implemented for this alternative. No roads would be improved or maintained by DNRC, at this time. No revenue would be generated for the Common School Trust. Collections of funds for Forest Improvements (such as for tree planting) would be forgone.<br>*The Ryan Gulch Fire Suppression Rehabilitation Plan was implemented, Fall of 2000 (copy of plan, attached). See; also item 7, impacts to Vegetation.* |

## II. IMPACTS ON THE PHYSICAL ENVIRONMENT

| RESOURCE | [Y/N] POTENTIAL IMPACTS AND MITIGATION MEASURES N = Not present or No Impact will occur.Y = Impacts may occur (explain below) |
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| 4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE: Are fragile, compactible or unstable soils present? Are there unusual geologic features? Are there special reclamation considerations? Are cumulative impacts likely to occur as a result of this proposed action? | [Y] There is potential for soil displacement resulting from salvage activities including road use. These concerns are addressed in detail in the Watershed and Soils report, (attached). Recommendations to minimize adverse impacts or improve existing conditions have been incorporated into the project design; mitigation, stipulations and controls are presented there in. |
| 5. WATER QUALITY, QUANTITY AND DISTRIBUTION: Are important surface or groundwater resources present? Is there potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality? Are cumulative impacts likely to occur as a result of this proposed action? | [Y] Water-yield increases and sedimentation are addressed in detail in the Watershed and Soils report (attached), recommendations to minimize adverse impacts or improve existing conditions have been incorporated into the project design, mitigation, stipulations and controls are presented there in. There are not any streams or other bodies of water present within salvage units. The proposed harvest activities are not expected to increase sediment yield to stream channels. This is largely due to the location of the proposed harvest units along the landscape and mitigation designed to minimize erosion. There is little risk of measurable adverse impacts to downstream water quality and beneficial uses occurring as a result of the proposed action alternative. Results from the cumulative watershed effects analysis estimate increases in average annual water yield due to timber harvest and road construction in Cramer Creek would be below the 15% threshold set by DNRC. |
| 6. AIR QUALITY: Will pollutants or particulate be produced? Is the project influenced by air quality regulations or zones (Class I airshed)? Are cumulative impacts likely to occur as a result of this proposed action? | [Y] Burning logging slash would produce a variable amount of smoke. Smoke may drift into the Clark Fork River Valley and or Cramer Creek drainage following burning activities, particularly during nighttime air inversions. Smoke from other burning projects may also cumulatively add to the smoke produced from this project. Impacts are expected to be minor and temporary with slash burning to be conducted when conditions favor good to excellent smoke dispersion (as determined by the Montana Department of Environmental Quality and the Montana -Idaho Airshed Group). Dust resulting from log hauling during dry periods could impact local residents. |

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| 7. VEGETATION COVER, QUANTITY AND QUALITY: Will vegetative communities be permanently altered? Are any rare plants or cover types present? Are cumulative impacts likely to occur as a result of this proposed action? | [Y] A Ryan Gulch Fire Suppression Rehabilitation Plan (attached) was implemented, independently of the proposed action. Restoration measures were implemented across the fire area. Fire lines and roads were stabilized and obliterated where appropriate with the landowner. Site specific erosion control measures (water-bars, seeding, mulching) were completed for the sensitive areas identified at stream crossings and on steep slopes.<br>"Ryan Gulch fire effects" (for State land) are listed in the table, and displayed in the fire intensity maps (attached). The fire was the cause of the major cumulative impact to vegetation. The cumulative effects analysis makes the assumption that private landowners adjacent to State of Montana Lands, will likely salvage harvest their land's (see Watershed and Soils, and Wildlife reports, attached). Fire effects closely define post fire harvest boundaries; (see proposed Post-Fire Harvest map, attached). Some "green" trees are proposed for harvest, they are fire damaged (sustained root and bole damage) lodge pole pine. The lodge pole pine which are expected to die, occur in a 32 acre stand of Douglas fir and Western Larch, NE 1/4 of section 36, T12N, R16W, which sustained a mixed severity fire. The live Douglas fir and Western Larch will be retained. A portion of the lodge pole pine may survive therefor removal of these trees, with respect to forest cover, would have a direct, long-term and cumulative negative effect. With respect to big game species the effect would be minimal (Checklist for Endangered, Threatened and Sensitive Species, attached). The effect of reducing forest cover with respect to water yield increases in the Cramer Creek drainage would be 0.1% (Watershed and Soils report, attached). Within the stand replacement post-fire harvest areas approximately four large diameter snags per acre, on average would be retained (see Wildlife report, p.12). Given the proposed mitigation and that 24% of the burned merchantable acres are proposed for harvest, there would be relatively low negative direct, long-term and cumulative effects to snags and coarse woody debris, as a result of the proposed action (Wildlife report, p.13). Impacts, mitigation and controls with respect to recruitment of snags and coarse woody debris are discussed in the Wildlife, and in the Watershed and Soils reports (attached).<br>There is concern that activities associated with salvage operations will impede and or disrupt natural regeneration and natural plant succession. Mitigation designed to protect soil resources (see Watershed and Soils Report, attached) should, to a limited extent, help protect natural vegetation and establishment thereof, as well. Areas which burned would be assessed for planting of site adapted conifer species in accordance with DNRC bio-diversity goals. Retention of sub-merchantable trees and snag recruits should, to a limited extent (when compared to leaving all dead trees) help to ameliorate site conditions.<br>There is concern that weed seed is expected to spread into the fire area, which would result in competition with native species trying to establish in the recently disturbed area. Ground disturbing activities associated with the proposed Action Alternative have the potential to introduce or spread noxious weeds in susceptible habitat types. Under the Action Alternative, DNRC would follow an integrated weed management approach (see Watershed and Soils Report, attached) to help prevent the introduction and establishment of noxious weeds and slow the expansion of existing weeds. A combination of prevention, revegetation and monitoring would be implemented to reduce the possible infestation and spread of weeds associated with this project. "Off road" equipment will be cleaned prior to being brought on site. No old growth stands are proposed for harvest.<br><u>Biodiversity Guidance and Old Growth Management</u><br>Biodiversity RMS 7 in the SFLMP states, "<u>Biological Diversity Strategies for Forest Type Groups</u>" [Remington's Study] or other current references would be used as guidance for landscape-level biodiversity evaluations, old-growth protection, and design of timber harvests to promote biodiversity. The Biological diversity strategies would be updated periodically, with professional review, as new information and concepts are developed.<br><br>In May 1998, <u>Remington's Biodiversity Strategies</u> was superseded by the Biodiversity Guidance as allowed for and encouraged under Biodiversity RMS 6 and 7. The Biodiversity Guidance was sent out for internal and external professional review in the summer and fall of 1997. <u>Remington's Biodiversity Strategies</u> is cited in the Biodiversity Guidance as being a tool to help suggest appropriate Cover types for various habitat types (BIO-9); however, Remington's Study is not to be used where it is inconsistent with the Biodiversity RMS or the Biodiversity Guidance.<br>In particular, the <u>Landscape Planning</u> and <u>Old Growth Protection</u> portions of Remington's Study are not applicable to current management strategies since they are inconsistent with direction in Biodiversity RMS 1, 3, and 6. The adoption of the Biodiversity guidance in May 1998 cleared up these inconsistencies and should be viewed as the current procedure for managing for biodiversity and old growth on State lands. |

| RESOURCE | [Y/N] POTENTIAL IMPACTS AND MITIGATION MEASURES |
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| 8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS: Is there substantial use of the area by important wildlife, birds or fish? Are cumulative impacts likely to occur as a result of this proposed action? | [Y] There are no known fish bearing streams draining any of the State sections within the proposed harvest areas. The majority of the drainage features within the proposed sale area are discontinuous with no surface delivery to any fish-bearing streams. Population data sampled by the Bureau of Land Management in the early 1980's indicate that West slope cutthroat, rainbow and eastern brook trout are present in the mainstem of Cramer Creek and some of it's perennial tributaries above and below the State's proposed sale area. No fish data for Marcella Creek was available, however it is likely that isolated populations of trout exist within its perennial reaches. There are two perennial stream segments that exist within State ownership. These streams would not have any harvest units adjacent to them. Due to planning and the local stream characteristics, it is unlikely that the proposed timber sale would affect large woody debris recruitment, shade or in-stream temperature of fish-bearing streams. The action alternative includes improvements to mitigate problems associated with the existing road system. These improvements are expected to reduce the risk of additional impacts to fish-bearing streams during the proposed sale activities. In addition, these improvements would have a minor long-term positive influence on water quality and fisheries habitat in the watersheds draining the proposed sale area. For more detail see Watershed and Soils Report, attached. The effects to Big Game from the Action Alternative would be minimal, however there would be some direct, long-term and cumulative negative effects by removing trees that provide shade and cover. For an assessment of effects to wildlife species and for more detail, see the Wildlife report and the Checklist for Endangered, Threatened and Sensitive Species, attached. |
| 9. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES: Are any federally listed threatened or endangered species or identified habitat present? Any wetlands? Sensitive Species or Species of special concern? Are cumulative impacts likely to occur as a result of this proposed action? | [Y] The Bald Eagle is listed as Threatened in the state of Montana under the Endangered Species Act. There is a Bald Eagle nest site in section 21, T11N, R15W. There would be low potential for direct, long-term or cumulative negative effects to Bald Eagles for the Action Alternative (Checklist for Threatened and Endangered and Sensitive Species, attached). The Black-Backed Woodpecker is listed by DNRC as a Sensitive Species and is afforded special management under DNRC policy. Impacts and mitigation with respect to the Blacked-backed Woodpecker are discussed in the Wildlife report (attached). Effects to other wildlife species are listed in the Checklist for Endangered, Threatened and Sensitive Species, attached. In summary there is either low potential for direct, long-term or cumulative negative effects for the Action Alternative or there is no preferred or suitable habitat for the species of concern, listed therein. There is a Great Blue Heron rookery located in section 14, T11N, R16W. This proposal should not affect the Heron rookery. The Montana Heritage Program lists occurrences for five species of snails: section 14 and 17; T11N, R14W; section 15,T11N, R15W; sections 10 and 18, T11N, R16W. None of these areas or similar habitats would be entered under the Action Alternative. Rare plants or cover types as listed by the Montana Heritage Program are not known to exist, nor would similar habitats be entered, within the proposed salvage areas. There are known occurrences of sensitive or rare plants in sections 14, 24 and 34; T11N, R15W; these areas will not be affected by this proposal. |
| 10. HISTORICAL AND ARCHAEOLOGICAL SITES: Are any historical, archaeological or paleontological resources present? | [N] No historical or archaeological sites are recorded within the harvest areas. Clearance has been granted (See "Archaeology" report, attached). |

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| 11. AESTHETICS: Is the project on a prominent topographic feature? Will it be visible from populated or scenic areas? Will there be excessive noise or light? Are cumulative impacts likely to occur as a result of this proposed action? | [Y] A portion of section 36, T12N, R16W is a prominent ridge top, which is visible from the Clark Fork River Valley and Interstate 90, Beaver Tail Hill area. Portions of sections 4,8,16; T11N, R15W are visible along Interstate 90, Clark Fork river Valley, from Beaver Tail Hill to Medicine Tree Hill. Harvest areas are closely defined by fire effects and as such more natural patterns would be maintained. Of the burned merchantable acreage 24% is proposed for harvest (Sections 4, 16 and 36). Where as some natural patterns would be maintained, so also patterns of ownership could become more prevalent, as adjacent land owner's cut up to State property lines. In Sections 4 and 36 proposed harvest areas which sustained a stand replacement fire; any live trees, ~4 large diameter snags per acre and sub-merchantable trees would be retained, individually or in-groups as they occur. This would maintain a portion of the natural patterns. In Sections 16 and 36, proposed harvest areas which sustained mixed severity fire, individuals and groups of dead (or dying lodge pole pine in Section 36) trees would be removed. In doing so some natural patterns would be maintained. |
| 12. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY: Will the project use resources that are limited in the area? Are there other activities nearby that will affect the project? Are cumulative impacts likely to occur as a result of this proposed action? | [Y] Lands adjacent to the Montana State Lands are small privately owned lands and Timber Industry owned lands. Post fire salvage is occurring on these Timber Industry and small private holdings. The cumulative effects analysis has accounted for activities on these lands with respect to State of Montana Lands (see Watershed and Soils, and Wildlife reports, attached). |
| 13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA: Are there other studies, plans or projects on this tract? Are cumulative impacts likely to occur as a result of other private, state or federal current actions w/n the analysis area, or from future proposed state actions that are under MEPA review (scoping) or permitting review by any state agency w/n the analysis area? | [Y] A recent watershed analysis was completed on May 15, 2000 in conjunction with the Proposed Cramer Creek Timber Sale. For purposes of this proposal, that existing conditions analysis was updated to reflect the Ryan Gulch Fire. Results from the cumulative watershed effects analysis estimate increases in average annual water yield due to timber harvest and road construction in Cramer Creek would be below the 15% threshold set by DNRC. |

## III. IMPACTS ON THE HUMAN POPULATION

| RESOURCE | [Y/N] POTENTIAL IMPACTS AND MITIGATION MEASURES |
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| 14. HUMAN HEALTH AND SAFETY: Will this project add to health and safety risks in the area? | [N] |
| 15. INDUSTRIAL, COMMERCIAL AND AGRICULTURAL ACTIVITIES AND PRODUCTION: Will the project add to or alter these activities? | [N] |
| 16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT: Will the project create, move or eliminate jobs? If so estimated number. Are cumulative impacts likely to occur as a result of this proposed action? | [N] People are currently employed in the wood products industry in the region. Due to the relatively small size of the timber sale program, there will be no measurable cumulative impact from this proposed action on employment. |

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| 17. LOCAL AND STATE TAX BASE AND TAX REVENUES: Will the project create or eliminate tax revenue? Are cumulative impacts likely to occur as a result of this proposed action? | [N] People are currently paying taxes from the wood products industry in the region. Due to the relatively small size of the timber sale program, there will be no measurable cumulative impact from this proposed action on tax revenues. |
| 18. DEMAND FOR GOVERNMENT SERVICES: Will substantial traffic be added to existing roads? Will other services (fire protection, police, schools, etc) be needed? Are cumulative impacts likely to occur as a result of this proposed action? | [N] There will be no measurable cumulative impacts related to demand for government services due to the relatively small size of the timber sale program, the short-term impacts to traffic, and the small possibility of a few people temporarily relocating to the area. |
| 19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS: Are there State, County, City, USFS, BLM, Tribal, etc. zoning or management plans in effect? | [Y] In June 1996, DNRC began implementation of the State Forest Land Management Plan (Plan). The management direction provided in the Plan comprises the framework within which specific project planning and activities take place. The Plan philosophy and appropriate Resource Management Standards have been incorporated into the design of the proposed action. The Ryan Gulch Fire Suppression Rehabilitation Plan was implemented, Fall of 2000 (copy of plan, attached). |
| 20. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES: Are wilderness or recreational areas nearby or accessed through this tract? Is there recreational potential within the tract? Are cumulative impacts likely to occur as a result of this proposed action? | [N] The area surrounding the proposed project is heavily roaded and has and will likely continue to be intensively managed for the harvesting of wood products. Therefor the area does not provide, relatively, any "high quality" recreational opportunities. Motorized access to the area is restricted. The area receives use by walk in hunters in the fall months. Proposed harvest activities would be scheduled to conclude October 31, 2001. This could impact hunter opportunities during the month of October starting at the beginning of archery season. Other non-motorized recreational activities could also be impacted. |
| 21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING: Will the project add to the population and require additional housing? Are cumulative impacts likely to occur as a result of this proposed action? | [N] There will be no measurable cumulative impacts related to population and housing due to relatively small size of the timber sale program, and the fact that people are already employed in this occupation in the region. |
| 22. SOCIAL STRUCTURES AND MORES: Is some disruption of native or traditional lifestyles or communities possible? | [N] |
| 23. CULTURAL UNIQUENESS AND DIVERSITY: Will the action cause a shift in some unique quality of the area? | [N] |
| 24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES: Is there a potential for other future uses for easement area other than for timber management? Is future use hypothetical? What is the estimated return to the trust. Are cumulative impacts likely to occur as a result of this proposed action? | [N] The action alternative is expected to provide $60,000 to $90,000 net revenue to the Common School Trust (this includes collections for Forest Improvements, See "Economics", attached). Forest improvement funds collected are used to fund activities such as planting trees, slash disposal, thinning and weed control. |

EA Checklist Prepared By: Richard D. Stocker (Name) Forester (Title) January 17, 2001 (Date)

## IV. FINDING

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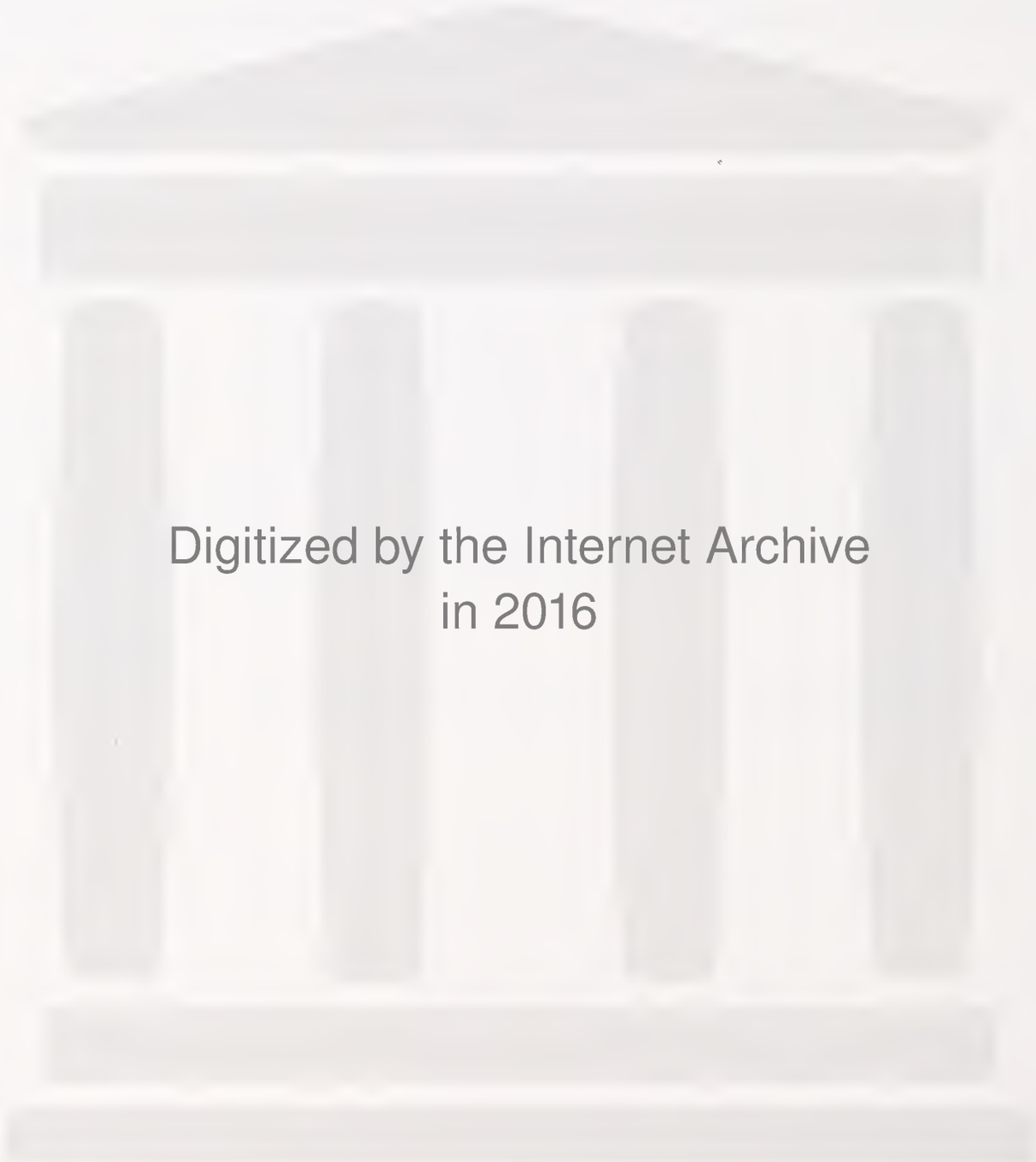
| 25. ALTERNATIVE SELECTED: | Alternative 1 (Action Alternative) |
| 26. SIGNIFICANCE OF POTENTIAL IMPACTS: | No Significant Impact as Proposed |
| 27. Need for Further Environmental Analysis: [ ] EIS [ ] More Detailed EA [ X ] No Further Analysis | |

EA Checklist Approved By: Robert M. Rich (Name) Missoula Unit Management Supervisor (Title)

Robert M. Rich (Signature) 1-18-01 (Date)



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# WATERSHED AND SOILS REPORT

**TO:** Rich Stocker, Forester Missoula Unit

**cc:** Jeff Collins, Soil Scientist, Forest Management Bureau
Gary Frank, Hydrologist, Forest Management Bureau
Tony Liane, Manager, Southwestern Land Office
Bill Schultz, Supervisor, State Land Management Section
Bob Storer, Manager, Forest & Lands Program

**FROM:** George Mathieus, Hydrologist, Forest Management Bureau

**SUBJECT:** Ryan Gulch Salvage Watershed & Soils Write-up

**DATE:** December 12, 2000

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Hydrology/Soils Existing Conditions & Affects Analysis
Ryan Gulch Salvage Timber Sale
T12N-R16W Section 36 & T11N-R15W Sections 4, 16
Southwestern Land Office, Missoula Unit

## INTRODUCTION

The following document contains background information for the watershed and hydrology portions of the proposed Ryan Gulch Salvage Timber Sale Environmental Assessment. This analysis includes an existing condition assessment of all watersheds draining the proposed sale area. Write-up and assessments are based on a coarse filter screening approach and an on-site field review of all contributing areas within the proposed state section.

## POTENTIAL ISSUES

Water Quality:

Land management activities such as timber harvest and road construction can impact water quality primarily by accelerating sediment delivery above natural levels to local stream channels and draw bottoms. These impacts are caused by erosion from road surfaces, skid trails, log landings and by the removal of vegetation along stream channels.

Soil Resources:

Equipment operations and timber harvest on wet sites or sensitive soils can result in soil impacts that effect soil productivity depending on area and degree of physical effects and amount or distribution of course woody debris retained for nutrient cycling.

Noxious Weeds:

Following disturbance events such as wildfires, fire suppression damage and timber harvest activities, invasion and spread of noxious weeds is more prevalent than in undisturbed areas. Noxious weed invasion and spread detrimentally influences surface cover, erosion and native species growth.

Cumulative Watershed Effects:

Cumulative watershed effects can be characterized as impacts on water quality and quantity that result from the interaction of disturbances, both human-caused and natural. Wildfires and timber harvest activities can affect the timing of runoff, increase sediment yields, increase peak flows and increase the total annual water yield of a particular drainage.

Cold Water Fisheries:

Land management activities such as timber harvest and road construction can impact fish habitat primarily by increasing water temperatures, accelerating sediment delivery above natural levels to local stream channels and by decreasing large woody debris input and shade cover through the removal of recruitable trees near the stream channel.

## AFFECTED ENVIRONMENT

Watersheds:

The proposed sale area is located near Beavertail, approximately 22 miles east of Missoula, Montana. The proposed sale area is located within three state sections that lie along two watershed divides, Cramer Creek and Marcella Creek, and also several unnamed intermittent and ephemeral face drainage's which drain into the Clark River.

The watershed analysis area addresses each watercourse draining the sale area to facilitate hydrologic analysis and cumulative watershed effects assessment. A description of those drainage's follows:

*Cramer Creek:*

Cramer Creek is a 17,067-acre watershed, which receives approximately 20 inches of annual precipitation. This third order stream is intercepted by irrigation ditches and ultimately a pond near its confluence with the Clark Fork River. During seasonally high flows, it is expected that surface waters from Cramer Creek reach the Clark Fork River. Cramer Creek is a Class I perennial stream according to the Montana Streamside Management Zone (SMZ) Law and Rules.

*Marcella Creek:*

Marcella Creek is a 1, 789-acre watershed, which receives approximately 20 inches of annual precipitation. A first order stream, Marcella Creek consists of perennial and subsurface flow indicative to the local geology. There is no evidence of surface connectivity with the Clark Fork River. Marcella Creek contains segments of Class II and Class III stream channel according to the SMZ Law and Rules.

*Unnamed Tributary # 1:*

This 909-acre watershed has segments of ephemeral and intermittent flow. It is a second order; Class II stream channel according to the SMZ Law and Rules.

*Unnamed Tributary # 2:*

This 1143-acre watershed has segments of ephemeral and intermittent flow. The channel that drains the proposed harvest area in State section 36 is ephemeral. It is a Class III stream channel according to the Montana SMZ Law and Rules.

*Cramer Creek Tributaries:*

Four ephemeral stream channels originate near the north line of Section 36. These drainage features are primarily ephemeral swales within the state boundary. There is no evidence of a channel or scour. Ultimately before reaching Cramer Creek, they become Class III stream channels with limited seasonal flow. Collectively, they drain a 255-acre area.

*Face Drainages:*

There are several ephemeral, discontinuous drainage features draining the proposed sale area. These areas do not contribute surface flow to any known watercourses. Combined, they make up approximately 915 total acres.

Regulatory Framework:

This portion of the Clark Fork River basin, including the Cramer and Marcella Creek drainage's, is classified B-1 in the Montana Water Quality Standards. Waters classified B-1 are suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonoid fishes and associated aquatic wildlife, waterfowl and furbearers; and agricultural and industrial water supply. State water quality regulations prohibit any increase in sediment above naturally occurring concentrations in waters classified B-1 (ARM 16.20.618 2(f)).

Naturally occurring means conditions or materials present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil and water conservation practices have been applied. Reasonable land, soil and water conservation practices include methods, measures or practices that protect present and reasonably anticipated beneficial uses. The state of Montana has adopted Forestry Best Management Practices (BMPs) through its Non-point Source Management Plan as the principal means of meeting Water Quality Standards.

Existing beneficial uses in the immediate vicinity of the proposed sale area include water rights for groundwater sources to include domestic uses. Surface water sources include irrigation, industrial and stock uses. There are no sensitive beneficial uses allocated in the sale area, however; downstream sensitive beneficial uses include aquatic life support and cold water fisheries.

Cramer Creek (MT76E004020) is currently listed as a water quality limited water body (as per Section 303(d) of the Clean Water Act) in the 305(b) report. The 303(d) list is compiled by the Montana Department of Environmental Quality (DEQ) as required by Section 303(d) of the Federal Clean Water Act and the Environmental Protection Agency (EPA) Water Quality Planning and Management Regulations (40 CFR, Part 130). Under these laws, DEQ is required to identify water bodies that do not fully meet water quality standards, or where beneficial uses are threatened or impaired. These water bodies are then characterized as "water quality limited" and thus targeted for Total Maximum Daily Load (TMDL) development. The TMDL process is used to determine the total allowable amount of pollutants in a water body of watershed. Each contributing source is allocated a portion of the allowable limit. These allocations are designed to achieve water quality standards.

The Montana Water Quality Act (MCA 75-5-701-705) also directs the DEQ to assess the quality of state waters, insure that sufficient and credible data exists to support a 303(d) listing and to develop TMDL for those waters identified as threatened or impaired. Under the Montana TMDL Law, new or expanded nonpoint source activities affecting a listed water body may commence and continue provided they are conducted in accordance with all reasonable land, soil and water conservation practices. Total Maximum Daily Loads have not been completed for the Cramer Creek drainage. DNRC will comply with the Law and interim guidance developed by DEQ

through implementation of all reasonable soil and water conservation practices, including Best Management Practices and Resource Management Standards as directed under the State Forest Management Plan.

The causes of impairment in Cramer Creek are metals, riparian degradation and siltation with the probable sources being abandoned mining, range/riparian grazing and silviculture. According to this report, Cramer Creek is partially supporting its aquatic life support, cold water fishery and recreation beneficial uses.

The Montana Streamside Management Zone (SMZ) Law (MCA 77-5-301) and Rules regulate timber harvest activities that occur adjacent to streams, lakes and other bodies of water. This law prohibits or restricts timber harvest and associated activities within a predetermined SMZ buffer on either side of the stream. The width of this buffer varies from 50-100 feet, depending on the steepness of the slope and the class of the stream.

The Montana Stream Protection Act (MCA 87-5-501) regulates activities conducted by government agencies that may affect the bed or banks of any stream in Montana. This law provides a mechanism to require implementation of BMPs in association with stream bank and channel modifications carried out by governmental entities. Agencies are required to notify the Montana Department of Fish, Wildlife and Parks (MDFWP) of any construction projects that may modify the natural existing conditions of any stream.

Section 36 Water Quality:

The majority of proposed fire salvage harvest in section 36 lies within an unnamed tributary watershed that drains into the Clark Fork River. Approximately 32 acres of the remaining proposed harvest lies within the Cramer Creek watershed.

Approximately 6.0 miles of Plum Creek Timber Company (PCTC), Louisiana Pacific (LP) and small private cost-share road provide access to the sale area. For the most part, the existing access road meets minimum BMP requirements. There are several newly installed or upgraded rolling dips that are currently functioning. Some of these dips have gabien-style structures at their outfall. These structures were presumably installed to help prevent fill slope erosion. Currently, these structures are effectively working, however due to poor design and implementation; these structures may eventually fail and become a long-term maintenance need. Segments of this same road system within State section 36 are lacking drainage features that would meet minimum BMPs. There are existing rolling dips, but they have been pounded out and are in need of maintenance and reshaping to comply with current standards.

Section 04 Water Quality:

The proposed harvest areas contained by Section 04 lie within the Marcella Creek Watershed.

Approximately 4.5 miles of existing road provides access to the sale area. The existing road accessing Section 04 is poorly located, poorly designed and does not meet minimum BMP standards. The road has virtually no surface drainage and maintains sustained grades ranging from 10-20%. Several segments follow directly up the draw at close proximity to the stream channel. The ideal long-term fix would be to obliterate and relocate the entire road system. However, this is not economically feasible. Adjacent road segments within the Marcella Creek watershed are rather extensive with very poor locations and excessive densities on private ownership.

There are three existing culverts in Marcella Creek along the proposed access route. The first contains perennial surface flow, but originates ~50 feet above the crossing structure. The stream channel consists of coarse angular rock covered in moss. This would indicate that seasonal flows are relatively low with minimal energy. The existing CMP is 24" X 30'. Scour lines from

previous flows are only utilizing ~20% of the allowed capacity. Due to a small drainage area, low amount of lost leaf area from the recent wildfire and the appearance of a losing channel due to high infiltration geology, loss of this crossing structure from increased flows is unlikely. The other two crossing structures occur along ephemeral stream channels and are expected to support moderate increases in flows from fire effects under normal seasonal conditions.

Section 16 Water Quality:

State section 16 lies within the Dry Gulch watershed, however proposed harvest activities would not occur within the watershed boundary. The drainage features associated with the proposed harvest area consist of steep, ephemeral draws with no evidence of recent seasonal flow.

The majority of the road systems within the proposed harvest area in Section 16 are poorly located and designed. These roads are not located near any stream channels or sensitive water resources. Use of these roads would be limited to skidding during designated operating periods.

Geology/Soil Resources:

The terrain is moderate to very steep mountain sideslopes with some abrupt slope breaks and deeply incised draws that reflect the structural bedrock control of the landscapes. Bedrock is mainly stable, Precambrian belt argillites, limestones and quartzites that are well fractured at depth, and form mostly gravelly skeletal soils. The limestone soils have some finer textured subsoil. Scree slope and rock outcrops are common on steeper slopes. Soils are shallow, mainly rapidly drained, and erosion potential is moderate to high.

Noxious Weeds:

Noxious weeds, mainly knapweed (Centaurea maculosa) and spots of thistle (Cirsium arvense) occur within the project area mainly along the existing roads. Knapweed is well established in most of the open grassland areas and areas with past harvest activities.

It is likely that ground disturbance associated with fire-suppression activities and extensive vehicle traffic may have introduced or spread noxious weeds within the proposed project area.

Cumulative Watershed Effects:

Past management activities surrounding the proposed sale area include mining, grazing, fire suppression, road construction and timber harvest. Timber harvest activities in the Cramer Creek watershed have been extensive over the past 30 years, constituting approximately 7651 acres. Marcella Creek and the previously described intermittent and ephemeral watersheds have been exposed to moderate to high levels of timber harvest on private lands. Most of the harvest on Plum Creek Timber ownership, including those parcels recently acquired from Champion Timber Company, has occurred in the past eight years. Grazing activities have also been extensive, with the bulk of activities concentrating in the lower reaches of both drainage's and along or near existing roads.

In addition to past management activities, all the drainage's within the proposal area have been exposed to the recent Ryan Gulch wildfire during August of 2000. The Ryan Gulch Fire consumed approximately 17, 118 acres. Effects from the fire cover a full range of burn intensities, however only severe burn intensities were mapped.

All drainage features in the proposed sale watershed analysis area were inventoried and evaluated by a DNRC hydrologist. Impacts occurring are the result of poor road locations and design, trampling, bank shearing and soil erosion from cattle trails. The cattle impacts are minor in extent, as they are confined to isolated reaches easily accessible to cattle.

Within the Ryan Gulch Fire analysis area, increases in peak flows, surface runoff, erosion and subsequent sediment delivery, nutrient levels and stream temperatures are anticipated following the recent wildfire. Measurable quantities of these impacts may vary across the fire area and would be dependent on the nature of the stream channels, intensity of burned area, local geology, and the timing, duration and intensity of snowmelt and spring rain events. Measurable impacts are more likely to occur in perennial drainage's where burn intensities are high.

A cumulative watershed effects (CWE) analysis for the proposed sale area was completed by DNRC to determine the existing conditions of the affected watersheds and the potential for cumulative effects due to increased sediment yields. The Cramer and Marcella Creek watersheds were chosen as the analysis boundaries. These analysis areas were selected because they were determined to be the most appropriate scale to detect potential effects. A summary of recent research suggests detection of hydrologic cumulative effects should focus on third-to fourth-order basins (NCASI, 1999).

All intermittent and ephemeral stream channels that fell outside of delineated watershed boundaries were also analyzed, even though the scale is likely not applicable. It is felt that this level of analysis would adequately predict on-site impacts.

As outlined in the SFLMP Watershed RMS # 7, the CWE analysis was completed using a Level II coarse filter approach to determine the existing conditions of the proposed sale area. This Level II was used to determine cumulative effects from past management activities and effects from wildfire. The coarse filter approach consisted of on-site evaluation, mapping the percent forested of each watershed and documenting history of past activities through the use of maps, aerial photographs and harvest records.

A recent watershed analysis was completed on May 15, 2000 in conjunction with the Proposed Cramer Creek Timber Sale. For purposes of this proposal, that existing conditions analysis was updated to reflect the Ryan Gulch Fire. This analysis was completed using the Equivalent Clearcut Area (ECA) methodology outlined in Forest Hydrology Part II (Region 1- USFS, 1974). This methodology was also used to estimate existing Water Yield Increases (WYI) in the Cramer Creek watershed. WYI is calculated as a function of area (acres) treated, percent forest crown removal, precipitation patterns and estimates of the amount of hydrologic recovery due to vegetative regrowth. To accurately describe the natural effects of the Ryan Gulch Fire (2000), a fire intensity map was obtained from local experts that describes burn intensities on the entire burn. Only high intensity burned areas were mapped across all ownership's. The fire intensity data was used to estimate ECA values using the Vegetation Manipulation Guidelines (1973). These guidelines suggest that following a burn, snow redistribution is changed, while 100% of evapotranspiration and 50% of the interception is lost. Thus, a percent water yield efficiancy (WYE) was developed for each fire intensity level. This percent water yield efficiancy was then multiplied by stand acres to obtain a year one ECA value.

Models used to predict ECA and WYI typically overestimate due to the fact that the model assumes 100% forest cover prior to management activities. Given the historic fire regime in the Cramer Creek watershed, complete canopy cover was highly unlikely. Using local knowledge of characteristics indicative of ponderosa pine and Douglas fir stands in the Missoula area, estimations of historic canopy cover were made using 1996 aerial photographs. Expected historic canopy cover ranged from 35-85%, depending on slope, aspect and elevation. The results of this analysis are summarized below in table 1:

200acres, approximately 32 acres of stand replacement emulation harvest is proposed in the NE1/4 of Section 36, T12N-R16W. This harvest would occur in a Western Larch / Douglas fir stand with a lodge pole pine component, which sustained a mixed severity burn. The lodge pole pines are either dead or severely stressed from wildfire effects. The lodge pole pines, some of which are "green", would be designated for harvest as would other dead tree species. No new road construction is planned for the proposed activities.

Water Quality:

*No Action Alternative:*

Under the No Action Alternative, existing substandard roads with inadequate road surface drainage would continue to impact water quality and downstream beneficial uses unless mitigation and remedial actions are undertaken.

*Action Alternative:*

Several changes to water quality are expected as a result of the recent Ryan Gulch wildfire. Conceivably, areas with severe burn intensities would show increased levels of sediment, nutrients and temperature in local stream channels. Given the ephemeral nature of the stream channels within the proposed sale area, detectable increases in nutrients and stream temperatures is unlikely as a result of the proposed activities. Increased levels of sediment delivery to draws and ephemeral stream channels are anticipated following spring runoff. In addition to minimizing impacts from the proposed harvest activities, mitigation measures would be implemented to also help minimize erosion associated with the recent wildfire.

Harvest units can directly impact water quality if not properly located or buffered. The risk of impacts is greatest along streams, wetlands and lakes. The Streamside Management Zone Law (SMZ Law) regulates forest management activities that occur adjacent to streams, lakes or other bodies of water. All proposed activities would be conducted in accordance with the SMZ law and Rules. All areas requiring SMZ delineation have been field reviewed by a DNRC Hydrologist to determine their adequacy in meeting the requirements of the law and satisfying the SFLMP guidance to protect water quality and aquatic resources.

Portions of the sale area are drained by ephemeral draws, swales and wet areas that lack discernable stream channels. Equipment restrictions and designated crossings would be utilized to protect all wet areas and ephemeral draws.

The primary risk to water quality is associated with roads, especially roads constructed along or crossing streams. Sediment delivery from existing roads is expected to increase over past levels as a result of the recent wildfire. This is largely due to increases in runoff from loss of leaf area and the loss of road cut and fills vegetation, which provided a stabilization mechanism. DNRC would utilize all reasonable mitigation and erosion control practices during any reconditioning or reconstruction of all roads, stream and draw crossings during the proposed activities. Site specific design recommendations from DNRC Hydrologist, Soil Scientist would be fully implemented under the action alternative. No new roads or stream crossings are planned for the proposed activities.

Up to 10.5 miles of existing low standard road would be improved under the action alternative to a standard that meets minimum BMPs. Under the DNRC proposal, these road segments would be improved to reduce erosion and delivery to the affected stream channels and draw bottoms. Improvements include, but are not limited to, installation and or reconstruction of road surface drainage features, stabilization of eroding cut and fill slopes and installation of sediment buffer structures i.e. slash filter windrows and/or filter fabric fencing with straw bales (depending on site location).

TABLE 1:

**RYAN GULCH PROPOSED SALVAGE**
Watershed Existing Conditions Analysis

| Watershed | Drainage Pattern | Total Acres | Existing Road Miles* | Total ECA | Area in ECA | Water Yield Increase** |
|---|---|---|---|---|---|---|
| Cramer Creek | Perennial | 17067 | 125 | 3950 acres | 23% | ~ 10.1% |

* Existing road miles were estimated off of 1996 aerial photographs and USGS quads.
** Water Yield Increase (WYI) is an estimate of percent water yield over expected natural levels due to management activities.

All primary and secondary roads within the proposed sale area were evaluated for past or potential impacts. Field evaluations indicate that past management activities within the analysis area have resulted in impacts to water quality. These impacts are limited to sediment delivery and erosion from roads and cattle use and are restricted to stream crossings and isolated segments of existing roads. Results from the cumulative watershed effects analysis estimate increases in average annual water yield due to timber harvest and road construction in Cramer Creek is below the 15% threshold set by DNRC. Thresholds are established using a matrix guide developed for the State Forest Land Management Plan (SFLMP) Watershed RMS # 7, which uses an acceptable risk level, watershed sensitivity and resource value as its parameters.

In addition to the proposed State harvest, there are current salvage activities on private ownership within the Ryan Gulch Fire perimeter. This salvage includes harvesting of any merchantable trees killed or damaged by the recent wildfire. The only known green harvest within the analysis area (outside of State ownership) is on Plum Creek and other private ground in Section 01, T11N-R16W. This activity falls within Unnamed Tributary # 2. Increases in water yield are likely following this activity.

Increases in erosion and sedimentation are also likely as a result of additional harvest on private lands. The levels of these impacts would be dependant on planning, rehabilitation efforts and the level of mitigation applied on site.

Cold Water Fisheries:

There are no known fish bearing streams draining any of the State sections in the proposed sale area. The majority of the sale area has drainage features that do not support fish. Population data sampled by the Bureau of Land Management in the early 1980's indicate that West slope cutthroat, rainbow and eastern brook trout are present in the mainstem of Cramer Creek and some of it's perennial tributaries above and below the State's proposed sale area. No fish data for Marcella Creek was available, however it is likely that isolated populations of trout exist in the perennial reaches.

Drainage features within each State section are ephemeral at best, and therefore do not support fish. Past grazing and timber harvest management have resulted in increased sediment and a decrease in the riparian shrub component and recruitable trees for in-channel large woody debris along existing tributary stream channels. It is likely that these impacts have resulted in loss of shade cover, bank stability, recruitable trees and increased temperatures, but due to disconnectivity, impacts to downstream fisheries have been minimal.

## ENVIRONMENTAL CONSEQUENCES

The proposed State timber sale is comprised of a no-action and action alternative. The action alternative is to salvage log up to 200 acres of timber damaged or killed by wildfire. Of this

*Cumulative Effects on Water Quality:*

Following the proposed sale activities, mitigation measures along the Marcella Creek road would be used to ensure long-term stability. These would include drainage features where location allows and measures to revegetate the existing road system.

Proper application of BMPs and site-specific designs and mitigation measures would reduce erosion and potential water quality impacts to an acceptable level as defined by the water quality standards. Acceptable levels are defined under the Montana Water Quality Standards as those conditions occurring where all reasonable land, soil and water conservation practices have been applied.

The proposed harvest activities are not expected to increase sediment yield to stream channels. This is largely due to the location of the proposed harvest units along the landscape and mitigation designed to minimize erosion. Several studies suggest that increases in erosion and sediment yield associated with post-fire harvest are largely attributed to new road construction and use of ground based and cable yarding systems in areas having steep slopes and sensitive soils without the protection of snow cover or frozen soils (Klock 1975, McIver 2000). No new roads are planned with this proposal and harvest operations would be conducted under frozen or dry conditions.

Erosion control measures and other improvements to the existing road system are expected to result in long term improvements to downstream water quality and improved protection of beneficial uses. There is little risk of measurable adverse impacts to downstream water quality and beneficial uses occurring as a result of the proposed action alternative.

Soil Resources:

*No Action Alternative:*

Under the no action alternative, erosion and subsequent loss of soil productivity would likely occur along steeper slopes where vegetation has been removed following the recent wildfire. Coarse woody debris recruitment for nutrient cycling and sediment interception would be limited during the short-term, when stability is critical.

*Action Alternative:*

Soils within the proposal area are fairly resilient and rocky, but shallow surface soils are susceptible to displacement from disturbance occurring from heavy equipment use. To minimize ground skidding effects and soil disturbance, skidding activities would be pre-planned and limited to dry or frozen soils on slopes less than 40 percent. These activities would be monitored by the sale administer during operations.

Due to the expected water yield increases and accelerated erosion as a result of the recent wildfire, it is likely that impacts from skidding activities would occur. Harvest operations conducted under frozen and snow-covered conditions would be the best scenario for minimizing impacts. Due to the timeframes associated with this proposed project, timing of operations during snow-covered conditions may not be feasible, but would more likely be conducted under frozen or dry conditions. Without snow-covered conditions, ground skidding effects have a higher likelihood of occurring on steeper slopes. To minimize anticipated impacts, harvest units would utilize erosion control where soil disturbance occurs in corridors and skid trails by leaving tops on site.

*Cumulative Effects to Soil Resources:*

Following levels of disturbance such as wildfires, coarse woody debris as logs, branches and twigs all act to slow expected surface water runoff, intercept and trap soil particles and slow erosion. The closer and more even the distribution of woody debris, the more effective the reduction of erosion. Coarse woody debris also provides many physical, chemical and biological properties which are vital to soil properties and forest growth. In conjunction with the proposed project, mitigation measures aimed at retaining coarse woody debris on site would be implemented. This is expected to maintain long-term soil productivity and reduce on-site erosion.

Noxious Weeds:

*No Action Alternative:*

Under the No Action Alternative, weed seed is expected to spread by vehicle traffic, wind and animal dispersion into the fire area, which would result in competition with native species trying to establish in the recently disturbed area.

*Action Alternative:*

Ground disturbing activities associated with the proposed action alternative have the potential to introduce or spread noxious weeds in susceptible habitat types. Under the Action Alternative, DNRC would follow an integrated weed management approach to help prevent the introduction and establishment of noxious weeds and slow the expansion of existing weeds.

*Cumulative Effects of Noxious Weeds:*

Invasion and spread of noxious weeds would decrease soil productivity and stability and reduce the reestablishment of native species. A combination of prevention, revegetation and monitoring would be implemented to reduce the possible infestation and spread of weeds associated with this project.

Cumulative Watershed Effects:

*No Action Alternative:*

The No Action Alternative would maintain measurable cumulative effects from past management activities and recent wildfire effects, but would decline as hydrologic recovery continues to occur.

*Action Alternative:*

The majority of the proposed salvage would occur in stands of dead timber as a result of the recent wildfire. These trees are no longer capable of removing water from the soil profile through the evapotranspiration process and they no longer provide substantial green canopy critical for snow and rainfall interception. Therefore, an increase in water yield above existing post-fire conditions is not applicable. However, the 32 acres of stand replacement emulation harvest in Section 36, T12N-R16W may contain some green leaf area. Thus a water yield increase as a result of the proposed treatment was analyzed for in the CWE analysis.

Results from the ECA/WY analysis show that projected harvest levels are below those levels normally associated with detrimental water yield increases and thus channel impacts. Expected water yield increases over current conditions resulting from the proposed sale area within the Cramer Creek watershed are 0.1% for the action alternative. Table 2 below summarizes

predicted increases in water yield and ECA following the proposed activities for each affected watershed.

TABLE 2.

**RYAN GULCH PROPOSED TIMBER SALE**
Watershed Proposed Activities ECA/WYI Analysis

| Watershed | Proposed Harvest | Proposed Roads | Proposed ECA | Cumulative ECA | Proposed WYI | Cumulative WYI* |
|---|---|---|---|---|---|---|
| Cramer Creek | 32 acres | 0 miles | 32 ac. | 3982 ac. | 0.1% | 10.2% |

* Water Yield Increase (WYI) is an estimate of percent water yield over natural levels due to management activities.

Estimated increases in average annual water yield due to timber harvest in Cramer Creek are below thresholds set by DNRC. It is unlikely that the proposed levels of harvest would contribute to detectable increases in water yield or have any measurable influence on downstream channel conditions.

Given the anticipated increases as a result of the recent wildfire, speculation could be made that a 0.1% increase in water yield resulting from harvest would be negligible. Furthermore, the analysis was conducted using a worse case scenario. The lodgepole pine targeted for salvage in the 32-acre unit in State Section 36 consists of dead or dying trees. Any trees showing any sign of green at this time are expected to die in a relatively short time period.

No increases in water yield are anticipated in the areas outside of the Cramer Creek watershed as a result of the proposed salvage harvest. This is due to the fact that only dead trees would be harvested. Increases in sediment yield are expected to be negligible due area treated location along the landscape, ephemeral nature of the drainage features and mitigation designed to minimize erosion.

Cold Water Fisheries:

*No Action Alternative:*

The no action alternative would continue to impact cold water fisheries habitat through erosion and sedimentation due to existing road conditions and locations and the current grazing strategy.

*Action Alternative:*

There are no known fish bearing streams draining the state sections within the proposed sale area. The majority of the drainage features within the proposed sale area are discontinuous with no surface delivery to any fish-bearing streams. The two perennial stream segments that exist within state ownership would not have any harvest units adjacent to them. Due to planning and the local stream characteristics, it is unlikely that the proposed timber sale would affect large woody debris recruitment, shade or in-stream temperature into downstream fish-bearing streams.

*Cumulative Effects on Fisheries:*

The action alternative includes improvements to mitigate problems associated with the existing road system. These improvements are expected to reduce the risk of additional impacts to fish-bearing streams during the proposed sale activities. In addition, these improvements would have a minor long-term positive influence on water quality and fisheries habitat in the watersheds draining the proposed sale area.

## RECOMMENDED MITIGATION MEASURES

Operations conducted in or near draw features and on steeper slopes have a higher risk of impacting soil resources and water quality. The following recommended mitigation measures would help minimize risk of impacts during the proposed activities. These mitigation measures are standard practices that may be applied to all harvest activities associated with the proposed Ryan Gulch Fire Salvage Timber Sale. Recommended site-specific, contract design mitigation would be provided in a separate document.

Currently, Plum Creek Timber Company is upgrading the Marcella Creek Road in conjunction with some of their ongoing salvage activities. These upgrades would likely affect the level of mitigation implemented by DNRC during the proposed activities associated with this write-up.

General Road Design and Mitigation Recommendations:

- Plan, design and improve existing road systems to meet long-term access needs and to fully comply with current BMPs.

- Construct drain dips, grade rolls and other drainage features where necessary and practical to insure adequate road surface drainage. **Install and maintain all road surface drainage concurrent with harvest activities, reconstruction and reconditioning.** Drain dips constructed on sustained road grades greater than 8% may require gravel surfacing to function properly. Sustained road grades greater than 10% may require installation of conveyor belt water divertors.

- Grass seed all newly constructed or reconstructed road cut and fills immediately after excavation.

- Leave all temporary or abandoned roads in a condition that will provide adequate drainage and will not require future maintenance. Partially obliterate abandoned roads through ripping and seeding. Where it is available, scatter slash across the ripped road surface. Install water bars at regular intervals to facilitate surface drainage.

- Construct additional drainage features on all approaches to draw and stream crossings to avoid concentrating runoff at crossing sites. Drainage features should be located close enough to the crossing to minimize the runoff contributing area, but at an adequate distance away from the crossing to provide for effective sediment filtering.

- Provide effective sediment filtration through the use of slash filter windrows, filter fabric fencing or straw bales along drainage features located in areas with inadequate buffer capacity. Note: straw bales alone may not be effective in areas with heavy concentrations of livestock or big game.

- Filter outlets of all ditches with direct delivery to streams or ephemeral draws with slash or filter fabric and straw bales.

- Incorporate slash filter windrows at all draw and stream crossings requiring fills that are more than 2 feet deep.

- Rock armor both the inlet and outlet of **all CMP installations**. Provide energy dissipaters at outfall of **all CMP installations**. Rock used for armoring should average 12 inches in diameter and not less than 6 inches in diameter.

- When excavating material in and around stream and draw crossings (i.e. installing new CMPs, cleaning inlets and outlets, constructing ditches, etc.) Special care should be taken so as not to cause an excessive amount of disturbance to the stream channel or area immediately adjacent to the crossing site. Excess or waste material should be disposed of at a location where it will not erode directly into the stream or draw bottom.

- Limit road use and hauling to dry, frozen or snow covered conditions. Suspend operations when these conditions are not met **before** rutting occurs.

- Where feasible, rip, seed, water bar and slash any non-system roads within the sale area concurrent with construction activities.

- Implement weed control to help reestablish ground cover, DNRC would monitor the sites for two years to determine if any new noxious weeds establish that were not previously identified, and develop treatments as necessary. Weed treatment measures may include spot herbicide treatment of noxious weeds as designated by the Forest Officer. Any herbicide treatments would be applied under the supervision of a licensed applicator, following label directions.

- Clean all equipment of plant parts, mud and weed seed to prevent the introduction of noxious weeds.

General Design and Mitigation Recommendations for Harvest Units:

- Implement Forestry BMPs as the minimum standard for all operations with the proposed timber sale.

- **Use minimum SMZ width required under SFLMP Watershed RMS # 10.** These widths may be greater than those required under the SMZ Law and Rules. The SMZ widths prescribed in Watershed RMS # 10 are dependent on: the erosion potential of soils at the site, the steepness of the side slope and the presence of any topographic breaks.

- Protect all ephemeral draws, springs and wet areas with marked equipment restriction zones (ERZ). If absolutely necessary, designate locations for skid trail crossings. Minimize number of crossings and space at 200 feet where feasible. This would minimize soil disturbance within the vicinity of the draws. Use designated crossings only under dry or frozen conditions.

- Develop a skidding plan prior to equipment operations. Skid trail planning would identify which main trails to use, and what additional trails are needed. Trails that do not comply with BMPs (i.e. draw bottom trails) should not be used and closed with additional drainage installed where needed or grass seeded to stabilize the site and control erosion.

- Leave 5 – 10 tons per acre of coarse woody material larger than 3 inches in diameter scattered throughout the sale units, predominately perpendicular to the slope. The Forest Officer should determine the appropriate amount of material and should designate pieces that would otherwise be skidded to be left for this purpose. This may require return skidding.

- Seed skid trails over 30%. Scatter slash on skid trails where feasible.

- Do not slash burn in or near areas of concentrated ephemeral flow.

## REFERENCES

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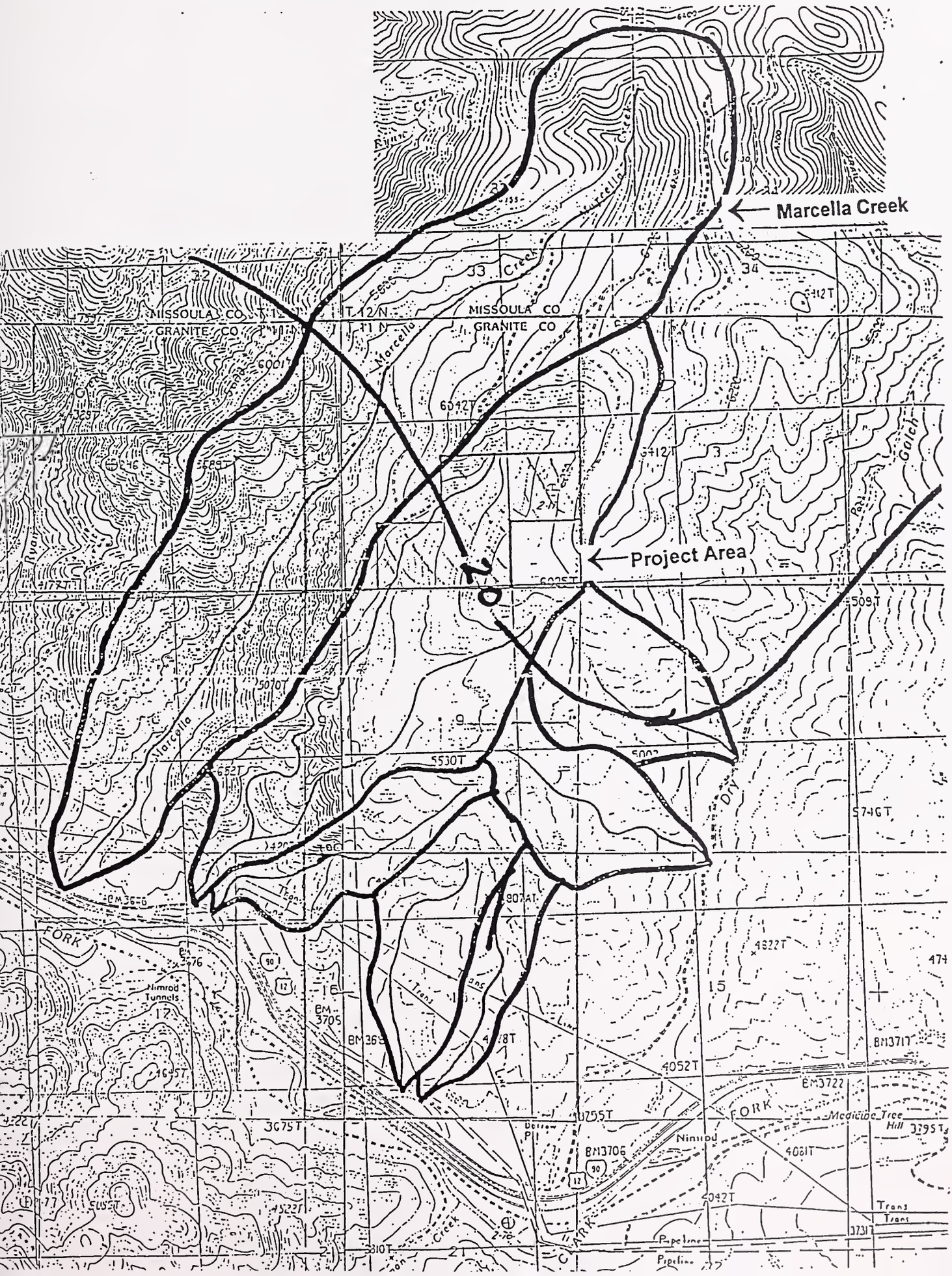
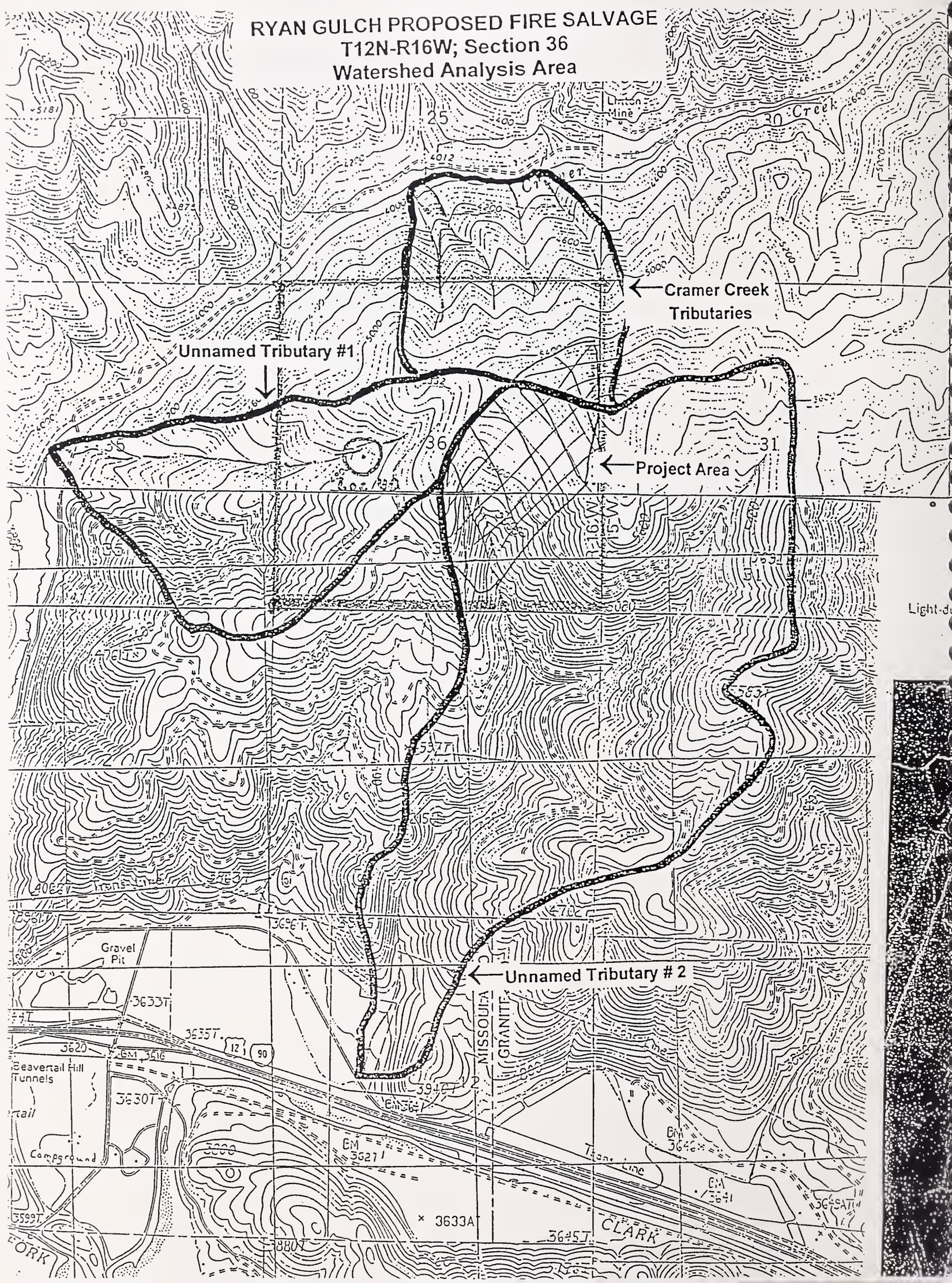
National Council of the Paper Industry for Air and Stream Improvement, Inc. (NCASI). 1999. Scale considerations and the detectability of sedimentary CWEs. Technical Bulletin No. 776. New York.

USDA Forest Service, Region 1, 1974. Forest hydrology, hydrologic effects of vegetation manipulation, Part II. Missoula, MT.

# RYAN GULCH PROPOSED FIRE SALVAGE
## T11N-R15W; Sections 4 & 16
## Marcella Creek Watershed Analysis Area and Associated Tributaries




RYAN GULCH PROPOSED FIRE SALVAGE
T12N-R16W; Section 36
Watershed Analysis Area
Cramer Creek Tributaries
Unnamed Tributary #1
Project Area
Unnamed Tributary # 2
Gravel Pit
Beavertail Hill Tunnels
Campground
MISSOULA
GRANITE
CLARK
Trans. Line
25
30
31
36
35
R.16 W.
R.15 W.

# RYAN GULCH PROPOSED FIRE SALVAGE

## T12N-R16W, Section 36

### Cramer Creek Watershed Analysis Area

# WILDLIFE REPORT

# AND

# CHECKLIST FOR ENDANGERED, THREATENED AND SENSITIVE SPECIES

**MEMORANDUM**

To: Rich Stocker, Missoula Unit
From: Rose Leach, Wildlife Biologist, SWLO
Date: 4 December 2000
Re: Proposed Ryan Gulch post-fire "salvage" harvest

The "project area" includes the DNRC sections proposed for harvest (Sec 36/T12N/R16W, and Sections 4 and 16/T11N/R15W). The cumulative effects analysis area ("analysis area" includes the burned habitat surrounding the project area, essentially known as the Ryan Gulch fire complex (Figure WL-1). This includes lands with generally 2 types of fire intensity—mixed severity and stand-replacement—as well as unburned areas. In the project area, mixed severity contains areas that were non-lethal and areas that were lethal to overstory trees.

**Coarse Filter Analysis**

Few old growth stands occur in the project area. Almost none occurs in the analysis area. The few old growth stands present in the project area would not be entered. These are discussed in the affected environment for each individual section, described in the issue "Large-sized (newly-dead) trees, large pieces of coarse woody debris, and potential snag recruitment". No formerly-green old growth habitat is proposed for harvest. Therefore, the usual coarse filter to assess current amounts of and effects to old growth was not used. Important components of old growth, however, are discussed in the "large-sized tree" issue. Effects to wildlife species of concern are found in the Checklist for Endangered, Threatened and Sensitive Species (attached).

**Issues**

Two wildlife-related issues driving the analysis include the following: 1) Large-sized (newly dead) trees, large pieces of coarse woody debris; and potential snag recruitment, and 2) Black-backed Woodpecker Habitat. These are discussed below.

**Issue #1--Large-sized (newly dead) trees, large pieces of coarse woody debris, and potential snag recruitment**

**Affected Environment--Project Area**

**Section 36**

Species observed during field trip (29 Aug 2000) Clark's Nutcracker, Pine Siskin, Red-breasted Nuthatch, Dark-eyed Junco, and Hairy Woodpecker.

During field review, we noticed abundant seeds (mostly Douglas fir with some ponderosa pine) on the ground. These were attracting the above-listed seed-eaters. Section 36 has been extensively logged. Records indicate that approximately 190 acres in the central and southern portion of the section were selectively logged in 1969. In 1990, a portion of that harvest area and other parts of the section were clearcut. Total volume removed since 1967

was 1.56 million board feet, mostly ponderosa pine and Douglas-fir. The clearcut, other previously-logged areas, and unlogged habitat burned during summer 2000.

Section 36 contains 120 acres of mixed severity and 190 acres of stand-replacement post-fire habitat (Table WL-1). Burned stands of merchantable trees were composed mostly of ponderosa pine and Douglas-fir cover types 100-149 years old (SLI data). Total acres of timber burned (Table WL-1) were used to assist in planning, such as addressing black-backed woodpecker habitat guidance (SS p.9-10, see species-specific issue below).

Table WL-1 Burn severity and stand merchantability by section, DNRC lands, Ryan Gulch fire, summer 2000.

| Section | Mixed Severity | | Stand Replacement | | Unburned |
|---|---|---|---|---|---|
| | Merch | Non-Merch | Merch | Non-Merch | Merch/Non-Merch |
| 36 | 106 | 14 | 122 | 68 (clearcut) | 330 |
| 16 | 382[1] | 176 | 0* | 0 | 0 |
| 4 | 24 | 265 | 117 | 55 | 0 |
| 2 | 0 | 0 | 0 | 23 | 496 |
| 8 | 80 | 0 | 0 | 0 | 0 |
| Total[2] | 592 | 455 | 239 | 146 | 826 |

[1]Within the 382 acres of mixed severity, Section 16 has 1 to 4-acre microsites of Stand Replacement burn that total approximately 40-60 acres
[2]Acre estimates include a total of 27.6 acres of roads.

In Section 36, most of the burn occurred in the southeast corner, on south to west facing and some east-facing slopes. The burn extends uphill to a prominent ridge where the fire intensity diminished. Some burned habitat occurs on the "back side" of this ridge (north- and west-facing slopes). However, relatively few acres were burned compared to the "front side" (see discussion below). Initial field review of merchantable stands showed the stand replacement portion of the burn (on the south-east facing slopes) that was located below the road was composed of fairly homogeneous medium-sized trees. Above the road, the aspect changed and there were more large-sized trees present (average 4 per acre $\geq$ 21 inches d.b.h., field cruise post-fire, Missoula Unit). The portion above the road totaled approximately 70 acres of the stand replacement fire. Some microsites of that area would not be operable, however, because of steep rocky pitches scattered throughout the stands.

Pre-fire, snags and snag recruitment trees were relatively scarce in Section 36 due to past harvest. Average stand dbh from SLI data range from 13-22 inches. The stands with the most "yellow pine" and the largest diameters were # 3 and 4. These were not burned. Burned stands included portions of # 7-15 (fire intensity map per section, attached). Past clearcuts are located in portions of stands 1, 10, 11, and 13. Harvest is proposed for portions of 7, 8, and 9.

The "back side" of the ridge included some burned habitat as well. This dense stand is 32 acres of 6-10 inch dbh lodgepole pine (portions of stand 7). Some scattered western larch

and Douglas fir also occur in the stand. Part of the stand experienced a low intensity ground fire but would be considered for harvest at this time. The only green trees proposed for harvest would be 6-10 inch dbh lodgepole pine. The lodgepole pine component sustained root and bole damage. This low vigor lodgepole pine is at high risk for mortality as a result of the fire damage. Other reasons for harvest include dense conditions, low stand diversity (small-sized lodgepole adjacent to other similar dense stands that would not be entered); and the relative ease of planning and removal given potential post-burn harvest in the section. Essentially few large-sized live trees, large snags, or large pieces of coarse woody debris (including newly-dead) occur in this portion of the stand. The entire stand (56 acres) provides dense cover, but this structure is also available as the stand continues down hill below the road.

**Section 8**
Species Heard: Clark's Nutcracker
DNRC ownership in this section was selectively logged in 1990 leaving most of the large-sized ponderosa pine. This, coupled with favorable weather and burning conditions created a non-lethal underburn in this section. Average diameter is currently approximately 18-20 inches dbh (Bob Rich, pers. comm). Large pieces of coarse woody debris appear to have withstood the fire and occur on the ground. Scattered decadent aspen occur in the DNRC portion of Section 8 as well. However, they appeared green post-fire, so suckering may not have been stimulated. This section would not be entered in this proposal.

**Section 4**
Heard Pine Siskin, Red Crossbill
This section was formerly owned and logged by the BLM. Two burn patches were stand replacement, 40 and 123 acres each. They are separated by previously logged; stand replacement burned habitat that occurs on private land. The proposal is to enter only the 40-acre parcel in the southeast corner of the section. Due to steep slopes, approximately 30-35 acres of that would be harvested. Pre-fire trees were mostly Douglas fir, 10 inches dbh, average, 40-99 years old (SLI data).

Most of Section 4 was composed of stands less than 100 years old (SLI data) and non-merchantable (Table WL1). The exceptions were stands 1 and 9, both Douglas-fir old growth pre-burn. Neither would be entered in this proposal. Stand 1 (13 acres) burned with mixed severity and stand 9 (55 acres) burned as stand replacement.

A large stand-replacement burn patch (123 acres) is located on the West Side of the section. Approximately half (67 acres) of this patch is merchantable. The entire stand replacement patch in Section 4, together with adjacent mixed severity burned patches in Section 8 and the remainder of Section 4, totals approximately 520 contiguous burned acres that would not be proposed for harvest. However, much of this patch is not merchantable. The mixed severity portion of this patch is composed of 104 acres of merchantable material and 265 acres of nonmerchantable stands.

**Section 16**
Species heard: Red Crossbill, Pine Siskin
This section is composed of 560 DNRC-owned acres of mixed-severity burn. Only 10 acres are proposed for harvest, on the lower slopes located between the powerline and the Interstate. Approximately 40-60 acres of stand-replacement burn occurs scattered throughout this patch, in microsites too small to map. Green trees also occur throughout the area. All green trees would be retained.

Pre-burn, Section 16 was composed of 391 acres of 100-149 year old stands, 56 acres of 40-99 year old stands, 111 acres of non-forest, and 2 acres of road (SLI data). Average dbh ranged from 12-18 inches. The largest trees were in stands 7 and 10, neither of which would be proposed for harvest. Both of those stands contained relatively high proportions of "yellow pine".

**Affected Environment--Analysis Area**
The sections of the project area are surrounded by private timberlands (industrial and small landowner), and some BLM. Much of the analysis area has been previously harvested. In harvested areas, large-sized snags and live trees were scarce before the burn. Tree densities of all merchantable-sized material were lower than in unlogged areas, and were generally less than 50 trees per acre pre-burn. Approximately 17,118 acres burned (as a result of the Ryan Gulch Fire) in the analysis area. However, because of pre-fire treatment, post-burn conditions for species associated with large-sized snags and coarse woody debris, or dense stand conditions would be less suitable than if more material were available before the fire. The exception was adjacent and east of Section 36, in the northwest corner of Section 31. This small patch had not yet been harvested, and contained fairly dense cover of medium-to-large-sized trees. This area received a low to mixed severity burn on part of the acres, so most of the trees are still green. The remainder of Section 31 has been extensively logged.

Because most of the analysis area is private timberland, we expect remaining burned habitat and perhaps green trees to be aggressively harvested in the near future. As a result, standing dead tree densities surrounding DNRC patches would be expected to be lower than they are now (i.e., lower than 50 trees per acre, average).

**Proposed Snag Mitigation**
Hitchcox (1995) reviewed snag retention levels recommended by other authors of post-burn habitat studies. Because stand replacement burns have essentially no green trees, snag recruitment is interrupted. To compensate for this, more snags of the size and type that would remain standing the longest would need to be left now (Raphael and White 1984). In general, newly dead snags that may remain standing for at least 88 years are hard (at the time of the fire), large-sized ponderosa pine and Douglas-fir (Lehmkuhl and others 1997). Saab and Dudley (1998) also recommend leaving more large-sized ($\geq$ 20 inched dbh) snags in burned forests, because those snags have greater longevity than smaller snags. This is consistent with the findings of Hutto (1995:1053) regarding post-fire use of large trees by birds: "Selective tree removal also generally results in removal of the very tree species and sizes preferred by the more fire-dependent birds." These included

large-sized ponderosa pine, western larch and Douglas-fir. Further, Hutto (1995) recommended leaving uncut habitat in clumps, to provide microsites required by post-fire bird associates.

Snag recommendations listed by Hitchcox (1996) include the following:

- In a study of snag availability and use by cavity users 15 years post-fire, Raphael and White (1984) recommended 4.27 soft snags by year 15. To achieve this goal, one would leave 4 times as many hard snags to produce 1 soft snag at year 15. That is, one would leave 17 hard snags per acre, average immediately post-fire.
- In a post-fire study near Miller Creek (Missoula Co.), Harris (1982) recommended leaving western larch and large snags.
- Other recent studies (Hutto 1995, Hitchcox 1996, Saab and Dudley, 1998, Hejl and McFadzen 2000, Powell 2000) suggested leaving snags in clumps rather than singly throughout the burn. Evenly-spaced selective harvest changes microsites that may be important for post-fire bird associates. Therefore, unentered habitat should be retained in clumps, which more closely emulates natural processes.
- Snags should be distributed to meet the needs of less vagile species, and to ultimately provide coarse woody debris across the landscape. Therefore, snags need to be retained on every 40 acres of habitat (Bull 1990). Using the numbers above, if all snags were retained in 1 patch per 40 acres, one would need 40 * 17 = 680 snags to meet recommended levels.
- Recommendations from the Lolo National Forest for warm dry habitat types include 12 large-sized (20+ inches dbh) snags per acre, generally ponderosa pine. Of those, 1-2 would approximate current snags and 8-10 would be considered replacement (in lieu of recruitment) snags. In addition, although snags can be clumped, some should be available for each stand (Mike Hillis, pers. comm. Sept 2000, adapted from Northern Region Snag Management Protocol, Jan 2000). The recruitment figure is based on recent snag fall-rate models, which generally found the number of recruitment trees was at least = the snag number x 10 (Northern Region Protocol, adapted from Harris 1998. SNAGEQ: A model to examine large snag recruitment dynamics. Unpublished report).
- DNRC snag retention guidelines are currently 0.45 snags per acre at least 21 inches dbh (Biodiversity Guidelines, Bio-39). Using the above retention in lieu of recruitment factor of 10, then the minimum retention to meet DNRC snag guidelines would be 4.5 snags per acre, average.

**Issue #2--Black-backed Woodpecker Habitat**

**Background Information--Species Requirements**

Black-backed woodpeckers are a DNRC sensitive species. The bird is closely associated with burned forests. Hutto (1995:1050), in a review of bird communities following stand-replacement fire concluded "I believe it would be difficult to find a forest-bird species more restricted to a single vegetation cover type in the northern Rockies than the Black-backed woodpecker is to early post-fire conditions." SFLMP guidance (SS-p9) calls for retaining at least 20% of the burned acreage unentered from post-fire logging. We consider burned acreage to include all burn intensities, because often they occur as a mosaic and are

difficult to map separately. The entire burned complex is therefore considered when tallying the burned acreage. However, we assume that only merchantable stands could be suitable habitat for black-backed woodpeckers, given that this species nests and feeds on trees generally greater than 9 inches dbh. We defined merchantable as having at least 3,000 board feet/acre, average (Bob Rich, pers. comm.). Therefore, only merchantable burned stands (all severities) were used to determine deferred acreage for this project.

The guidance further states that the deferred areas should be "broadly representative of the entire burn (i.e., occupy similar habitat types, elevations, etc.) and be in a relatively contiguous block....". We note that SFLMP guidance gives examples of pre-burn habitat characteristics when explaining the term "representative of the entire burn", rather than suggesting that deferred areas represent different burn severity types. We suggest this is because the black-backed woodpecker is associated with habitats that have undergone stand replacement burns (rather than low intensity burns) when stand replacement habitat is available to them. Sallabanks and McIver (2000) suggest the black-backed woodpecker and olive-sided flycatcher are "precariously dependent upon stand-replacement fire". All studies of bird use of burned habitat suggest the strong affiliation of the black-backed woodpecker for stand-replacement burn types (Hutto 1995, Hejl and McFadzen 1998, Saab and Dudley 1998, Hejl and McFadzen 2000, Powell 2000, Sallabanks and McIver 2000). Therefore, we conclude that all other parameters being equal, mixed severity burns would be generally less suitable than stand replacement burns, when the 2 burn intensity types are available. Thus, we suggest that the first criteria for determining placement of a deferred area for the black-backed woodpecker is in merchantable, stand-replacement burned habitat. We do not, however suggest it is appropriate to merely tally the acres of stand replacement habitat, and defer 20% of that area. In most cases, the resultant deferral area would likely be too small to support even 1 woodpecker pair.

We recognize that during some years, other burn parameters may not be "equal". These include the following: burn patch size, landscape context of the burned patch, tree density pre-burn, size of newly-dead trees, species of newly-dead trees, the presence of broken topped trees before the burn, etc. Therefore, the suitability of a given area as potential black-backed woodpecker habitat would vary as those other parameters do.

Second, we infer the importance of high post-fire snag (newly-dead tree) density from universal recommendations from recent studies (Hutto 1995, Hitchcox 1996, Saab and Dudley 1998, Hutto and Young 1999, Hejl and McFadzen 2000, O'Connor and Hillis 2000, Powell 2000). Studies of black-backed woodpecker nesting all found significantly higher numbers of black-backed woodpecker nests in unlogged burned versus logged burned habitats. Hejl and McFadzen (2000) found 30 black-backed woodpecker nests at their unlogged site. They had 3-6 nests at their 3 logged sites (Table 1). Tree density was 80 snags (mostly newly dead trees) per acre at least 3.2 in dbh at black-backed woodpecker nest sites. Hutto (1995), in a review of recent literature on bird communities in burned coniferous forests, found the most important correlate to explain use of an area by black-backed woodpeckers was the density of small trees present.

Saab and Dudley (1998) found 13 black-backed woodpecker nests in unlogged habitats. Logged habitats each had 2. In plots characterizing black-backed woodpecker nest sites, average stem densities of snags ≥ 9 in dbh were 50 +- 11.

Hitchcox (1996) found no black-backed woodpecker nests in logged plots. That is, black-backed woodpecker nests were only found at unlogged plots. Tree density per acre was136 (~4-15.7 in dbh) and 9 (> 15.7 in dbh) at unlogged plots. This was significantly more dense than tree density at logged plots—52 trees/ acre for small trees and 0.17 trees per acre for large trees. Hitchcox (1996: 35) listed several papers that found fewer birds in logged versus unlogged burned plots (Blake 1962, Lyon and Marzluff 1984, Raphael and White 1984, Harris 1982, Caton 1996). She concluded that there was "...no published evidence of benefits for any wildlife from logging after burns."

Third, we infer importance to black-backed woodpeckers of burn patch size based on the following information. In general, home ranges are smaller when an animal occupies high quality habitat, compared to habitats of lower quality. It is energetically more efficient for an animal to meet its needs in a smaller area than a larger one. For example, when burned habitat is not available, the black-backed woodpecker is found in a structurally similar habitat—old growth lodgepole pine with high densities of bark beetles. In a study of such habitat in Oregon (Goggins et al. 1989), home ranges were large, resulting in lower bird densities than reported in burned habitats. Also, Goggins and others (1989) noticed little intra-specific overlap for this species. Based on radio-telemetry data from black-backed woodpeckers, Goggins and others (1989) recommended unentered retention areas of old growth beetle-infested lodgepole pine of 956 acres per pair with some habitat located below 4500 feet elevation.

Compare that recommendation to the following black-backed woodpecker densities found in recent studies of stand-replacement burned habitat: In a 472-acre burned study area, Powell (2000) surveyed 370 acres and found 9 pairs of black-backed woodpeckers. Powell (2000), citing Hejl and McFadzen (unpubl data), noted a 494-acre post-fire forest held 9 pairs of black-backed woodpecker. Powell also surveyed 1,359 acres of mountain pine beetle-infested LPP, at 4 different sites, and found no black-backed woodpeckers. He concluded that black-backed woodpeckers occurred at lower abundance in beetle outbreak habitat, and that this habitat is not equivalent to burned habitat. O'Conner and Hillis (2000) found average patch size occupied by black-backed woodpeckers was 225 acres. In that study, black-backed woodpeckers avoided edges of the burns. In setting up a research project in burned habitat in Idaho, Saab and Dudley (1998) set the treatment size (including unlogged controls) to average 1,235 acres. The unlogged areas appeared to be approximately 4,000 acres in size, based on maps presented. Hejl and McFadzen studied patch sizes that ranges from 100-700 acres (Table 2). Those studies focused on nesting densities and success in post-burned logged and unlogged habitat. Clearly, patch composition strongly influences use by black-backed woodpeckers (discussed above). However, several studies recommended retaining 'the bigger the patch the better' for conservation planning for black-backed woodpeckers (Hejl and McFadzen 2000b, O'Connor and Hillis 2000, and Powell 2000).

Table 2. Patch size and black-backed woodpecker nests found by treatment, from Hejl and McFadzen (2000).

| unlogged | "salvage" logged | Total burn area studied | No. Nests |
|---|---|---|---|
| | Acres | | |
| 380.5 | 98.8 | 479.4 | 6 |
| 229.8 | 607.9 | 837.7 | 5 |
| 177.9 | 158.1 | 336.1 | 3 |
| 694.4 | 0.0 | 694.4 | 30 |

Therefore, we rank habitat features important to black-backed woodpecker deferral areas in the following way:

1. Burn intensity. Stand replacement is most preferred.
2. Tree (snag) density. Black-backed woodpeckers used the densest stands available. In all studies, the birds occupied logged stands (i.e., areas with lower stem density) at significantly lower rates than unlogged stands. Where nests occurred in logged habitats, the nest sites were placed where residual stem density was the highest (Hejl and McFadzen 2000).
3. Patch size—the bigger the better. It appears that stand replacement burns of approximately 500 acres have supported 9 pairs of black-backed woodpeckers.

**Affected Environment-- Project and Analysis Areas**
**(Habitat Suitability)**

The project area has 3 patches of stand-replacement burned habitat (see Fire Intensity Overview Map). The patch in **Section 36** has 122 fairly contiguous acres of merchantable trees. Adjacent burned habitat on private land in the analysis area likely has less than 50 merchantable trees per acre, however, due to past harvest. This context tends to depress the relative habitat suitability of the stand replacement burn patch in Section 36.

The stand replacement patches in **Section 4** are fragmented. Merchantable material occurs in 4 disjunct, small patches of 40, 11, 55, and 12 acres each. The latter 2 are connected at a narrow corner, however. As in Section 36, adjacent habitat on private land in the analysis area likely has low stem density (<50 merchantable trees per acre) pre-fire. Patches of mixed severity DNRC habitat occurs adjacent to the stand replacement patches in Section 4. However, most of the mixed severity DNRC habitat in Section 4 is non-merchantable (Stands 2,3 and 8, see Fire Intensity Map for section 4). Merchantable mixed severity stands are also disjunct (Stands 1 and 4, see Fire Intensity Map for Section 4).

**Habitat Context**

During summer 2000, thousands of acres of stand-replacement fire occurred in large contiguous patches of merchantable timber throughout western Montana. Given this context, in our assessment the available stand replacement burn patches on DNRC land in the Ryan Gulch project area have relatively low suitability for black-backed woodpeckers. The patches are likely too sparsely stocked, fragmented, and small compared to available habitat in other burned areas in western Montana this year.

This is not to say that the Ryan Gulch area would not have some utility for black-backed woodpeckers. We believe it does. Further, we note that after 3-5 years, even the best habitat becomes less suitable for black-backed woodpeckers. Therefore, ranking of habitat suitability would apply to a 3-5 year-period. If the Ryan Gulch area were the only burned habitat available in this time period in western Montana, Ryan Gulch might have particularly high habitat value for black-backed woodpeckers, in spite of occurring in small patches and having areas of low tree densities. For example, Mike Hillis, Wildlife Biologist for the Lolo National Forest reported 2 pairs of black-backed woodpeckers in a 42-acre controlled burn patch during a year with little wildfire. Even a 2-acre controlled burn patch had 2 adults, possibly a pair (pers. comm., Sept 2000). Therefore, if no other burned habitat were available, we would perhaps recommend no harvest in the DNRC Ryan Gulch parcels, to provide what is usually a rare and ephemeral habitat for this fire-dependent species (Hitchcox 1996, Hejl and McFadzen 2000b). Powell (2000:89) notes "Because even partial logging of post-fire stands effectively eliminates habitat for species such as these (black-backed woodpecker, three-toed woodpecker, brown creeper), I suggest that areas designed to conserve black-backed woodpecker habitat should focus on large patches of predominantly prey-rich trees." Hutto and Young (1999:69) suggest "The presence of such narrowly distributed habitat specialists leaves little doubt that clearcutting associated with a large portion of salvage logging is in direct conflict with the needs of some of these bird species." Burn-associates they listed included the three-toed woodpecker, mountain bluebird, and black-backed woodpecker.

**Proposed Mitigation for Black-backed woodpecker**

Given the above information, we suggest placing the deferred habitat for this project in Sections 16, 8, and part of 4.

**Section 16** is composed of 382 acres of fairly contiguous, merchantable, mixed severity burned habitat, generally located north of the powerline corridor. The only area proposed for entry is south of the powerline corridor and is approximately 10 acres of scattered stand replacement habitat. Thus, fragmentation of burned habitat would be minimal. Other microsites of stand-replacement burn occur throughout this section as well. These may increase the section's attractiveness to the black-backed woodpecker. It is possible black-backed woodpeckers may nest in mixed severity habitat, although there may be less incentive to do so in a year such as 2000. Hitchcox (1996) found black-backed woodpecker nests in what would likely have been called mixed severity unlogged habitat, based on the description of green trees present there.

**Section 8** is composed of fairly large-sized trees that were underburned. This section exemplifies classic underburning in a ponderosa pine type, where most of the largest trees survived. As such, harvest at this time would not emulate natural processes. Some of the large trees may die in the future, if bugs attack or if time reveals that more of the cambium was damaged than initially thought. Trees that undergo slow death may be used less readily by black-backed woodpeckers than immediate-dead (Powell 2000), but such trees would provide snag habitat for other associated-species. Large-sized trees have been shown to be preferred for feeding sites of black-backed woodpeckers as well (Hutto 1995, Hejl and McFadzen 1998, Powell 2000).

In **Section 4**, a large (although patchily stocked) area of stand-replacement burn would not be entered. These 67 acres contains 55 acres of fairly high quality pre-burn old growth. This is adjacent to a large patch of mixed severity burn, also patchily stocked. Part of the adjacent mixed severity habitat, however, is the 80 acres of merchantable material in Section 8. Thus, at least part of this large not to be entered patch would have some fairly large-sized trees.

Table 3. Potential available habitat and proposed habitat retention commitments for black-backed woodpeckers, based on SFLMP guidance

| | **Mixed Severity** | **Stand Replacement** | **Total** |
|---|---|---|---|
| | **Acres[2]** | | |
| Total acres (patches ≥ 5 acres of merchantable-sized trees) burned habitat | 592 | 239 | 831 |
| 20% of total burned habitat to remain unentered, all merchantable<br><br>Goal:<br>20% (831) = 166 ac[1] deferred | <u>Areas of Deferral</u><br>Section 16<br>• 370 acres, 1 patch<br>Section 36<br>• 1 patch of 26 acres<br>• 1 patch of 48 acres<br>Section 8<br>• 80 acres, 1 patch<br>Section 4<br>• 24 ac, 2 patches<br><br>Total 548 acres deferred | <u>Areas of Deferral</u><br>Section 4<br>• West side—67 acres (1 hourglass-shaped patch)<br>• East side—16 (including steep acres)<br><br>Total ~ 83 acres SR burn (10 % of the burned area) would be deferred | |
| 13% of total to have reduced harvest<br>Goal:<br>13% (831) = 108 ac[1] to have reduced harvest | Total 548 acres MS burn (66 % of the burned area) would be deferred instead of 13% having reduced harvest | 0 | |
| Acres Harvested | 44 | 156 | 200 ac (24% of the merchantable acreage) |

[1]Based on habitat use demonstrated by black-backed woodpeckers, deferrals would be placed preferably in dense large patches of stand-replacement burned habitat. For this project, deferrals were placed depending on habitat suitability and context.
[2]Acre estimates include a total of 27.6 acres of roads.

The strategy of retaining large patches of mixed severity burned habitat unentered is consistent with suggestions of Hutto (1995) that call for maintaining a diversity of burned cover types, intensities, and a variety of landscape contexts with 1 exception. That is, stand replacement habitat would be retained in more suitable burned habitat (i.e., larger

patches of more dense trees) created elsewhere in western Montana during summer 2000. Further, this strategy follows the recommendation of leaving large patches unharvested, while concentrating harvest in other portions of a burn (Hutto 1995).

**Issue #1--Large-sized (newly dead) trees, large pieces of coarse woody debris, and potential snag recruitment**
**Environmental Consequences**

**Alternative A—No Action**
**Direct, Indirect and Cumulative Effects**
With no harvest, newly dead snag habitat would remain standing in the short-term. Abundant nest and feeding sites would be available for species associated with this habitat. Smaller trees would be expected to fall at rates faster than larger-diameter trees (Lehmkuhl and others 1997). Future fire danger would be low for approximately 9-12 years, because fine fuels have been removed. At that time, small-to medium sized material would have accumulated on the ground (Lehmkuhl and others 1997). Larger-diameter pieces, generally Douglas fir and ponderosa pine may remain standing for at least 88 years post-burn (Lehmkuhl and others 1997).

With no action, there would be no negative direct, long-term, or cumulative effects to wildlife species associated with burned habitat components. There would be direct, long-term and cumulative benefits to associated-wildlife species by not removing any fire-killed habitat. With no action there would be a gradual potential increased fire risk starting at approximately 9-12 years. This would be a long-term and cumulative negative effect to maintaining green tree habitat, resulting from the no action alternative.

**Alternative B Harvest**
**Direct, Indirect and Cumulative Effects**
Newly dead snags would be removed, a direct, long-term and cumulative negative effect to species associated with snags and coarse woody debris. Negative effects would be somewhat mitigated by not entering nearly all of the mixed severity merchantable patches that occur in the Ryan Gulch complex (Table 3). In addition, stands 5 and 9 in Section 4 would be retained unentered. These are stand-replacement merchantable patches that total 67 acres. Both stands contained some large-sized trees pre-burn. In general, unentered merchantable stands contain trees of similar species and size as those proposed for harvest. Long-term negative effects would be somewhat mitigated by retaining trees that were burned but still appear alive. These trees would become snags when they die, which may be sooner than if they had not been burned. In addition, long-term and cumulative negative effects would be somewhat mitigated by the patchy nature of the burn. That is, the supply of green trees for eventual snag recruitment has not been totally disrupted in mixed severity, merchantable stands.

Coarse woody debris was apparent in the mixed severity burned areas, indicating the fire did not incinerate this habitat component. Some new, relatively large pieces were added by felling trees during suppression. These large pieces would be retained. Similar to snag

recruitment, coarse woody debris would be recruited in the future by leaving green trees and by maintaining scorched trees on site.

In Alternative B, within stand replacement post-fire harvest areas in Section 36, an average of ~ 4 snags per acre ≥ 21 inches d.b.h. would be retained. Section 4 does not have 4 trees per acre, average, ≥ 21 inches dbh. Therefore, entered stands (stand replacement post-fire) in Section 4 would retain ~ 4 trees ≥ 18 inches dbh, average, if they are currently present. Burned trees < 18 inches dbh fall faster than unburned trees, so they would not provide suitable nesting habitat far into the future. Therefore, their retention provides little long-term mitigative effect. Retaining large-sized trees—which have the potential to remain standing long into the future—would somewhat mitigate negative effects of removing standing dead trees now. This is consistent with findings of Hutto (1995:1053) that showed the importance of maintaining large-sized ponderosa pine, Douglas fir (and western larch), which are "preferred by the more fire-dependent birds". In addition, this is consistent with DNRC snag retention guidelines using the recruitment factor of 10:1 (Northern Region Snag Protocol 2000). This also fits with the findings of Lehmkuhl and others (1997), who found larger-diameter Douglas fir and ponderosa pine remained standing for at least 88 years post-burn. (Their study occurred 88 years after a burn. Presumably trees standing 88 years post-burn did not all fall in year 89.)

In the analysis area, few snags and coarse woody debris pieces occur on surrounding private burned land. However, the DNRC ownership is too small and fragmented to provide all required snag habitat for endemic wildlife species in the entire Ryan Gulch complex. These habitat components need to be distributed on at least on every 40 acres of area. An even distribution of these components helps to meet the needs of species with low vagility.

In summary, with harvest there would be direct, long-term, and cumulative negative effects to snag and coarse woody debris by removing newly dead trees. Effects would be somewhat mitigated by retaining most newly dead trees ≥ 21 inches dbh in Section 36, and 4 per acre ≥ 18 inches dbh in Section 4. There would be a low potential benefit to the green portion of the stand by reducing the fire risk at 9-12 years. Approximately 76% of the entire burned acres with merchantable trees would not be entered for harvest, which would also help mitigate negative effects. Therefore, given the following:

1) mitigation in place, including retaining ~ 4 large trees per acre, average, where they now occur;
2) entering only selected habitats;
3) retaining essentially all mixed severity burned habitat (not to be entered); and
4) given the context of widespread burned habitat created during summer 2000, there would be relatively low negative direct, long-term and cumulative effects to snag and coarse woody habitat (and associated wildlife species), by this proposal.

**Issue #2--Black-Backed Woodpecker Habitat**
**Environmental Consequences**

**Alternative A—No Action**
**Direct, Indirect and Cumulative Effects**
With no action, there would not be any change to potential black-backed woodpecker habitat (stand-replacement burned patches). There would be no negative direct, long-term or cumulative effects to black-backed woodpecker habitat by this alternative. There would be direct, long-term and cumulative benefits to black-backed woodpecker habitat by no harvest. However, because current habitat suitability is relatively low, there would likely be no dramatic population-wide increases in black-backed woodpeckers in this area. Individual pairs may exploit the habitat, however. Small-to-medium sized trees would fall, potentially increasing fire risk by year 9-12. Increased fire risk would be a long-term and cumulative benefit to black-backed woodpecker habitat.

**Alternative B—Harvest**
**Direct, Indirect and Cumulative Effects**
Alternative B would essentially render entered stands of stand-replacement burned habitat unsuitable for black-backed woodpeckers. Therefore, the alternative would have direct, long-term and cumulative negative effects to this species. However, negative effects would be proportional to the current habitat suitability of the area. For the Ryan Gulch complex, habitat suitability is likely relatively low. Therefore, after harvest, areas that may have supported several pairs of birds would support fewer to none. However, vast areas of highly suitable habitat occur for this species in other burned habitat in western Montana. Therefore, although effects would be negative to this species in the Ryan Gulch area, there would likely be no considerable negative effect at the larger population level. Negative effects would be somewhat mitigated by leaving trees preferred by most post-fire bird associates—large-sized ponderosa pine and Douglas-fir trees. Large-sized trees would also provide preferred feeding sites for black-backed woodpeckers.

Logging would not occur during the nesting season (15 April to 1 July), as required by SFLMP black-backed woodpecker guidelines. This would protect nesting pairs during the 2001 season. After that time, harvest of burned trees from the project area would render it less suitable to unsuitable. Future nesting season timing restrictions would still benefit any nesting birds that might find the habitat appropriate.

In summary, there would be negative direct, long-term and cumulative effects to black-backed woodpecker habitat by removing burned habitat. However, negative effects should be viewed in the context of the landscape and the year. The following considerations temper negative effects: 1) proposed mitigations in place, 2) the context of vast areas of stand-replacement burned habitat created during summer 2000, and 3) low habitat suitability of the project area caused by pre-burn low tree density and small burn patch size. Therefore, negative effects would likely not be considerable to black-backed woodpeckers at the population scale.

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Contacts

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CHECKLIST FOR ENDANGERED, THREATENED AND SENSITIVE SPEICES
Pertains to Section II. 9. of the DS-252 DNRC Environmental Checklist

SOUTHWESTERN LAND OFFICE

| **Endangered, Threatened, and Sensitive Species** | [Y/N] Potential Impacts and Mitigation Measures<br>N = Not Present or No Impact is Likely to Occur<br>Y = Impacts May Occur (Explain Below) |
|---|---|
| Bald Eagle (*Haliaeetus leucocephalus*) federally-threatened, proposed for de-listing<br>Habitat: late-successional forest <1 mile from open water | [ Low potential for negative effects ] Bald eagles nest and winter in the vicinity, associated with the Clark Fork River. The birds roost and nest in large-sized trees, generally near the river and outside of the project and analysis areas. Eagles would likely feed on winter-killed big game in the project and analysis areas. However, tree harvest would likely not affect potential eagle-use (feeding) in the area.<br>**Effects**: Alt. A. There would be no change from the current conditions. Alt. B. There would be low potential for direct, long-term or cumulative negative effects to bald eagles. |
| Lynx (*Felis lynx*), Federally-threatened<br>Habitat: mosaics--dense sapling and old forest >5,000 ft. elev. | [ N ] Habitat in the project and analysis areas has low suitability for lynx. Thus, there is no potential for effects to this species from either alternative. |
| Gray Wolf (*Canis lupus*), Federally-endangered<br>Habitat: ample big game populations, security from human activity | [ Low potential for negative effects ] Gray wolves are wide-ranging mammals and could occur in the vicinity. They are associated with habitats that produce dependable food sources, such as big game winter ranges. Preferred winter habitats have low quality currently, due to the presence of the interstate and a railroad along the river. Although wolves could feed on carrion in the project or analysis area, the potential food availability and security from human activity (homes, ranches, traffic) is relatively low. **Effects**: Alt. A. There would be no change from the current conditions. Alt. B. There would be low potential for direct, long-term or cumulative negative effects to wolves. |

| | |
|---|---|
| Grizzly Bear (*Ursus arctos*), Federally-threatened<br>Habitat: recovery areas, security from human activity | [ N ] Grizzly bears could use either the project or analysis areas, but the incidence of occurrence would likely be low. Bears are associated with seasonal food sources, such as winter ranges, avalanche chutes, berry fields, white-bark pine nuts, and riparian areas. The project and analysis areas have low habitat suitability because few such habitats occur there, and security is low due to the interstate, a railroad, and homes along the river. **Effects**: Alt. A. There would be no change from the current conditions. Alt. B. There would be low potential for direct, long-term or cumulative negative effects to grizzly bears. |
| Pileated Woodpecker (*Dryocopus pileatus*)<br>Habitat: late-successional ponderosa pine and larch-fir forest | Pileated woodpeckers prefer large-sized ponderosa pine and western larch snags and coarse woody debris for feeding, roosting and nesting. Nest trees are usually in snags at least 18 inches dbh. The birds also use large-sized Douglas-fir for feeding. The birds are generally not associated with stand-replacement burns (Hutto 1995). Few large-sized trees occur in the project or analysis area. Nearly all would be retained post-harvest. The most likely habitat for this species is in the mixed severity burn in Section 16, where more large-sized trees occur. Only 10 acres of this section (560 acres) would be harvested. If large trees were removed from the project area, there would be direct, long-term, and cumulative negative effects to pileated woodpeckers. Given little planned change to large-sized trees, there would be low negative effects to this species. **Effects**: Alt. A. There would be no change from the current conditions. Alt. B. There would be low potential for direct, long-term or cumulative negative effects to pileated woodpeckers. |

| | |
|---|---|
| Flammulated Owl (*Otus flammeolus*)<br>Habitat: late-successional ponderosa pine and Douglas-fir forest | Potential flammulated owl habitat does not occur in the stand-replacement habitat of the project or analysis areas, but likely occurs in the mixed severity habitat in Section 16. Only 10 acres (of 560) would be harvested there. In the entire project area, nearly all of the trees > 21 inches dbh would be retained post-harvest. If large trees were removed from the project area, there would be direct, long-term, and cumulative negative effects to flammulated owls. Given little planned change to large-sized trees, there would be low negative effects to this species. **Effects**: Alt. A. There would be no change from the current conditions. Alt. B. There would be low potential for direct, long-term or cumulative negative effects to flammulated owls. |
| Coeur d' Alene Salamander (*Plethodon idahoensis*)<br>Habitat: waterfall spray zones, talus near cascading streams | [ N ] No preferred habitat occurs in the project or analysis areas. Thus, there is no potential for effects to this species from either alternative. |
| Boreal Owl (*Aegolius funereus*)<br>Habitat: mature to late-successional forest >5,200 ft. elev. | [ N ] No preferred habitat occurs in the project or analysis areas. Thus, there is no potential for effects to this species from either alternative. |
| Fisher (*Martes pennanti*)<br>Habitat: dense mature to old forest <6,000 ft. elevation and associated with riparian | [ N ] No preferred habitat—old growth riparian with abundant, large pieces of downed woody debris—occurs in the project or analysis areas. Thus, there is no potential for effects to this species from either alternative. |
| Black-Backed Woodpecker (*Picoides arcticus*)<br>Habitat: stand replacement burned habitat or beetle-infested forest | See issues discussed earlier in the document. |
| Northern Bog Lemming (*Synaptomys borealis*)<br>Habitat: sphagnum meadows, bogs or fens with thick moss mats | [ N ] No preferred habitat occurs in the project or analysis areas. Thus, there is no potential for effects to this species from either alternative. |

| | |
|---|---|
| Peregrine Falcon (*Falco peregrinus*)<br>Formerly federally-threatened, recently de-listed<br>Habitat: cliff features near open foraging areas or wetlands | [ N ] Peregrines may migrate through the project or analysis areas. However, no preferred habitats (cliff faces at least 50 m tall in proximity to abundant prey production areas) occur in the project or analysis areas. Therefore, no negative direct, long-term or cumulative effects are expected to occur as a result of either alternative. |
| Common Loon (*Gavia immer*)<br>Habitat: cold mountain lakes, nest in emergent vegetation | [ N ] No preferred habitat occurs in the project or analysis areas. Thus, there is no potential for effects to this species from either alternative. |
| Harlequin Duck (*Histrionicus histrionicus*)<br>Habitat: white-water streams, boulder and cobble substrates | [ N ] No preferred habitat occurs in the project or analysis areas. Thus, there is no potential for effects to this species from either alternative. |
| Ferruginous Hawk (*Buteo regalis*)<br>Habitat: prairies and badlands | [ Low potential for negative effects ] This raptor occurs in grassland habitat such as in the project and analysis areas. However, timber harvest would not affect these areas. If ferruginous hawks were seen during late winter or spring, the DNRC biologist would be notified and nest protection measures would be implemented as appropriate. Therefore, no negative direct, long-term or cumulative effects are expected to occur as a result of either alternative. |
| Columbian Sharp-Tailed Grouse (*Tympanuchus phasianellus columbianus*)<br>Habitat: grassland, shrubland, riparian, agriculture | [ N ] This species is only confirmed breeding in extreme northwestern Montana, near Eureka. Thus, there is no potential for effects to this species from either alternative. |
| Mountain Plover (*Charadrius montanus*)<br>Habitat: short-grass prairie, alkaline flats, prairie dog towns | [ N ] No short-grass prairie with prairie dog towns occurs in the project or analysis areas. Thus, there is no potential for effects to this species from either alternative. |
| Townsend's Big-Eared Bat (*Plecotus townsendii*)<br>Habitat: caves, caverns, old mines, large-hollow snags | [ N ] No caves, mines, lava tubes, or abandoned buildings occur in the area. Therefore, no suitable roosting habitat occurs. As a result, the occurrence of this species is unlikely. Thus, there is no potential for effects to this species from either alternative. |

| Other Species of Concern | |
|---|---|
| Big Game Considerations | Big game species do use recently burned habitats, particularly during spring green-up. Although little cover remains, deer and elk would likely use the area because roads are closed so that habitats are relatively secure. Burned trees do provide hiding cover and shade to big game. **Effects**: Alt. A. There would be no change from the current conditions. Alt. B. There would be some direct, long-term and cumulative negative effects by removing trees that provide shade and cover to big game. If roads are closed, however, habitats should be secure enough to allow foraging to occur. Therefore, negative effects would be minimal. |

# RYAN GULCH FIRE MAP (FIGURE WL-1)

# AND

# PROPOSED POST FIRE HARVEST MAP

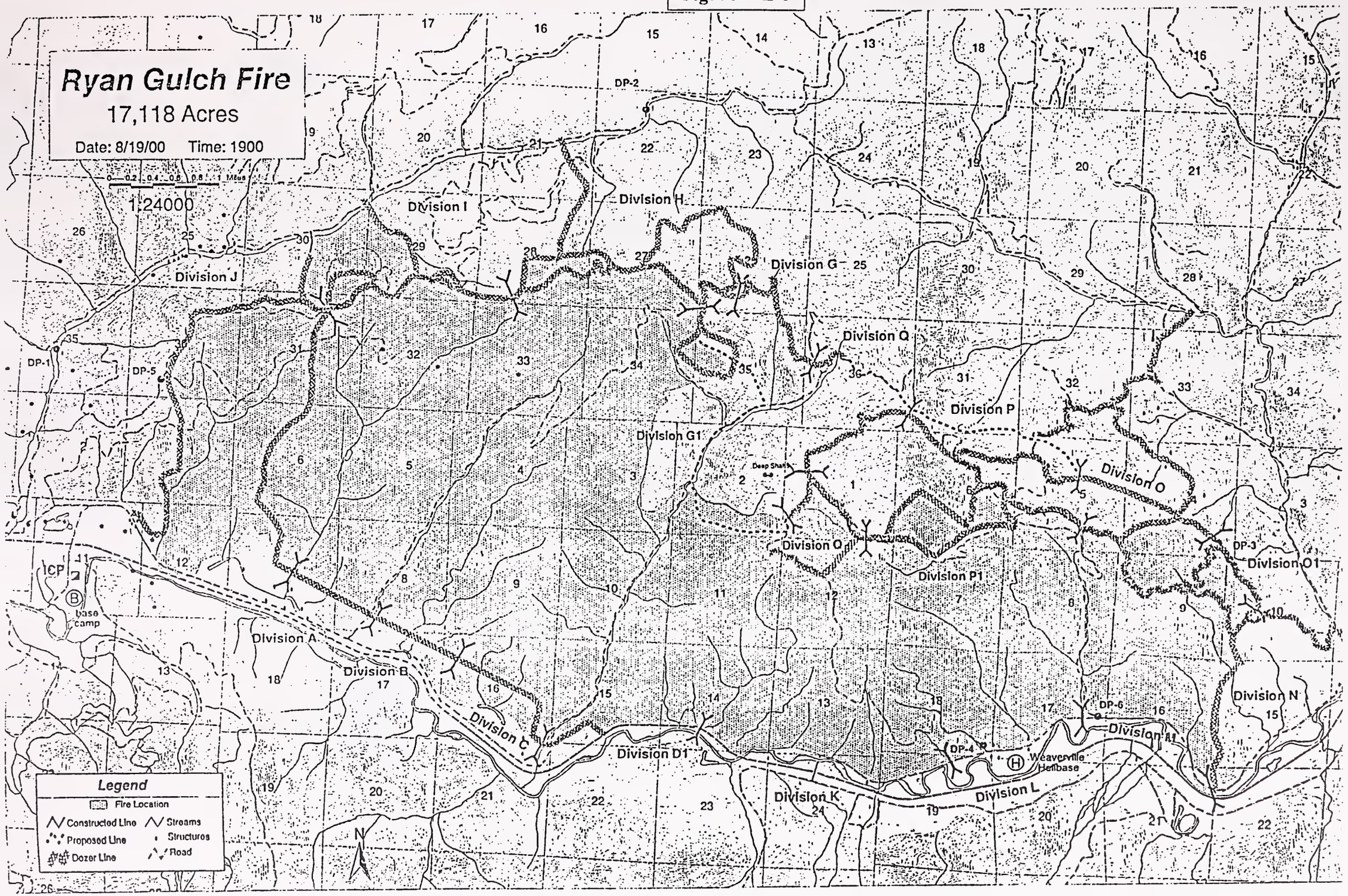
# AND

# FIRE INTENSITY MAPS

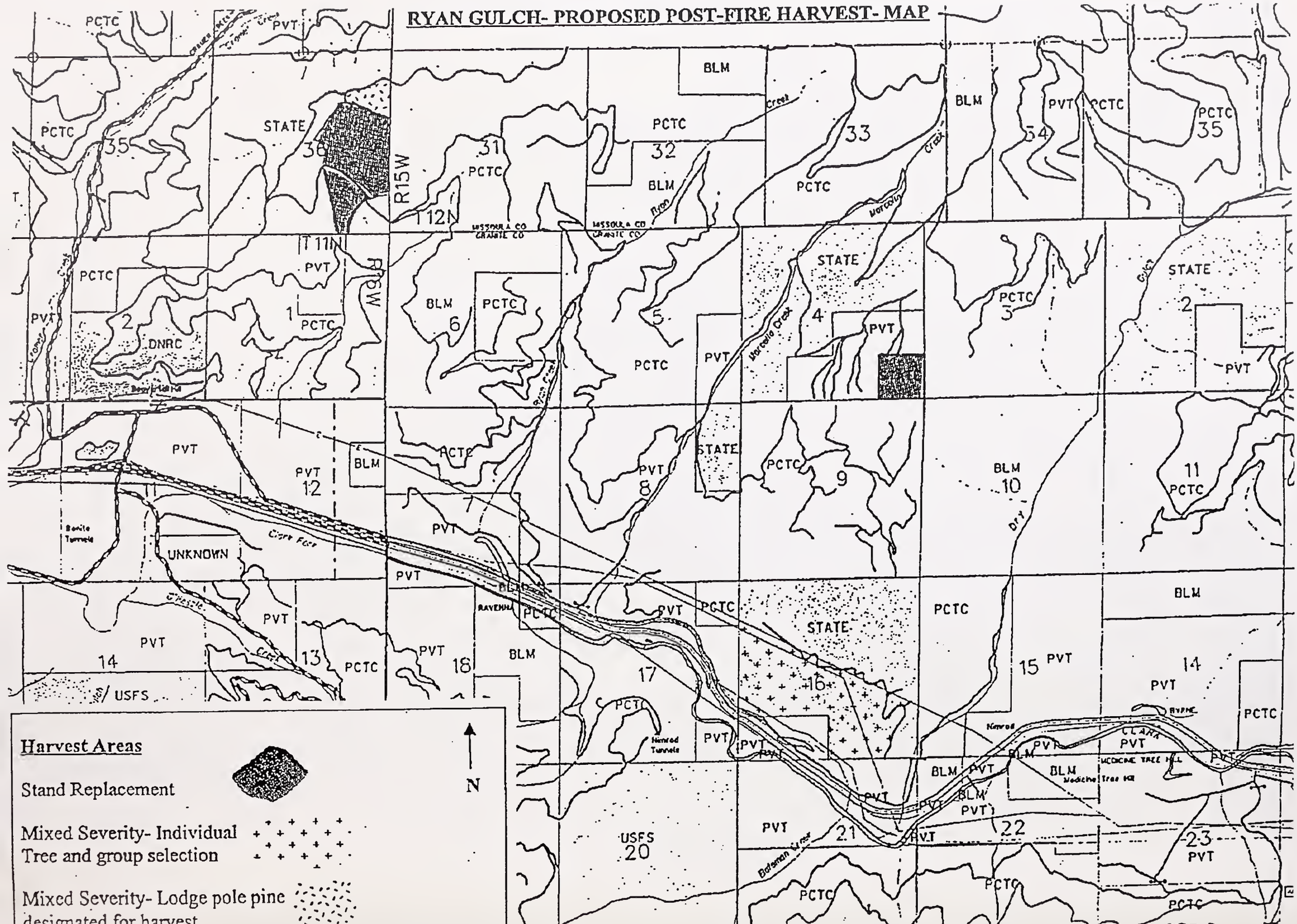
# AND

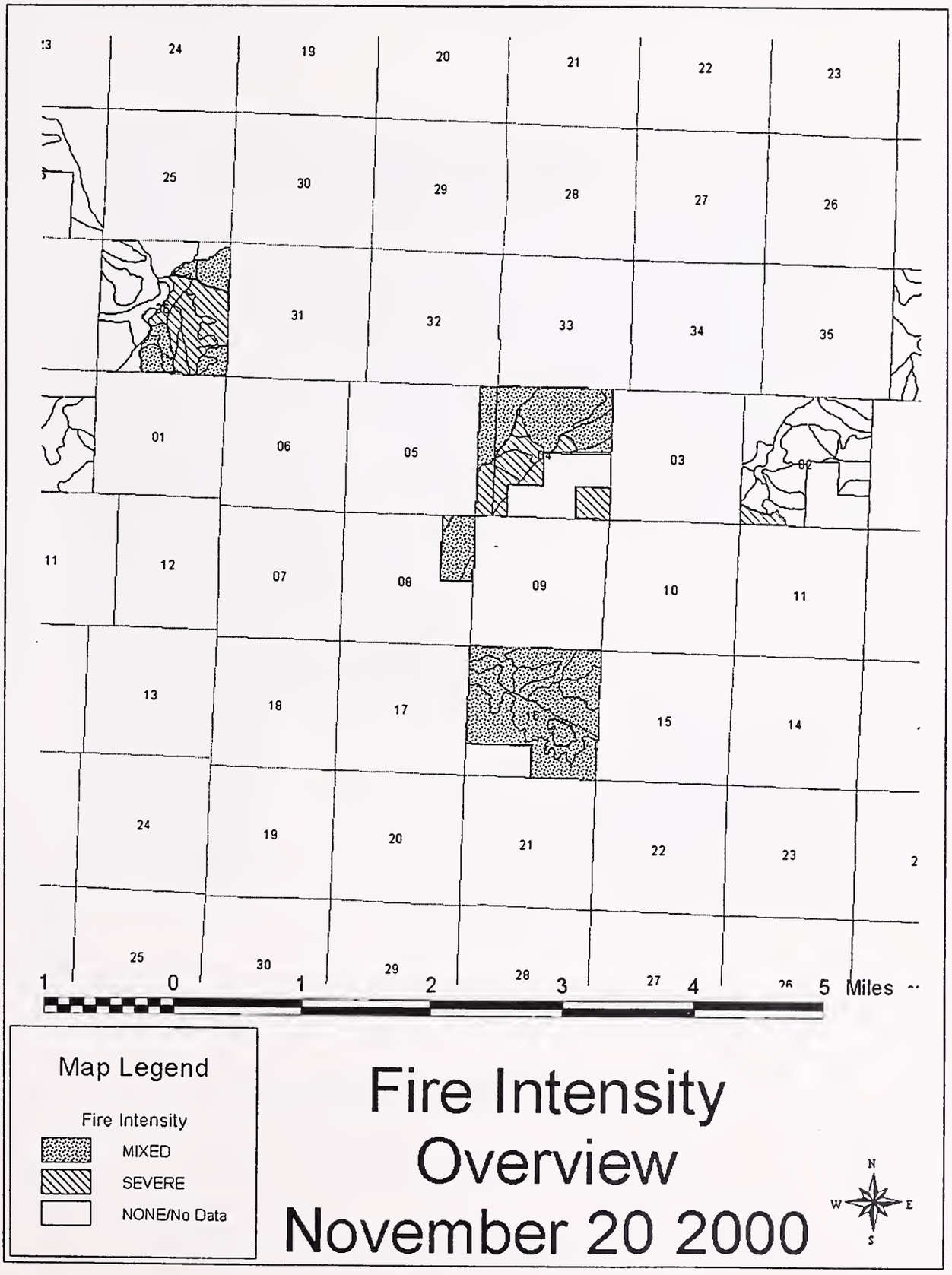
# STAND LEVEL INVENTORY DATA FIRE EFFECTS TABLES

Figure WL-1


Ryan Gulch Fire
17,118 Acres
Date: 8/19/00 Time: 1900
0 0.2 0.4 0.6 0.8 1 Miles
1:24000
DP-1
DP-2
DP-3
DP-4
DP-5
DP-6
Division A
Division B
Division C
Division D1
Division G
Division G1
Division H
Division I
Division J
Division K
Division L
Division N
Division O
Division O1
Division P
Division P1
Division Q
ICP
base camp
Deep Shaft
Weaverville Helibase
Legend
Fire Location
Constructed Line
Proposed Line
Dozer Line
Streams
Structures
Road
N

# RYAN GULCH- PROPOSED POST-FIRE HARVEST- MAP

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Map Legend
Fire Intensity
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NONE/No Data
Fire Intensity
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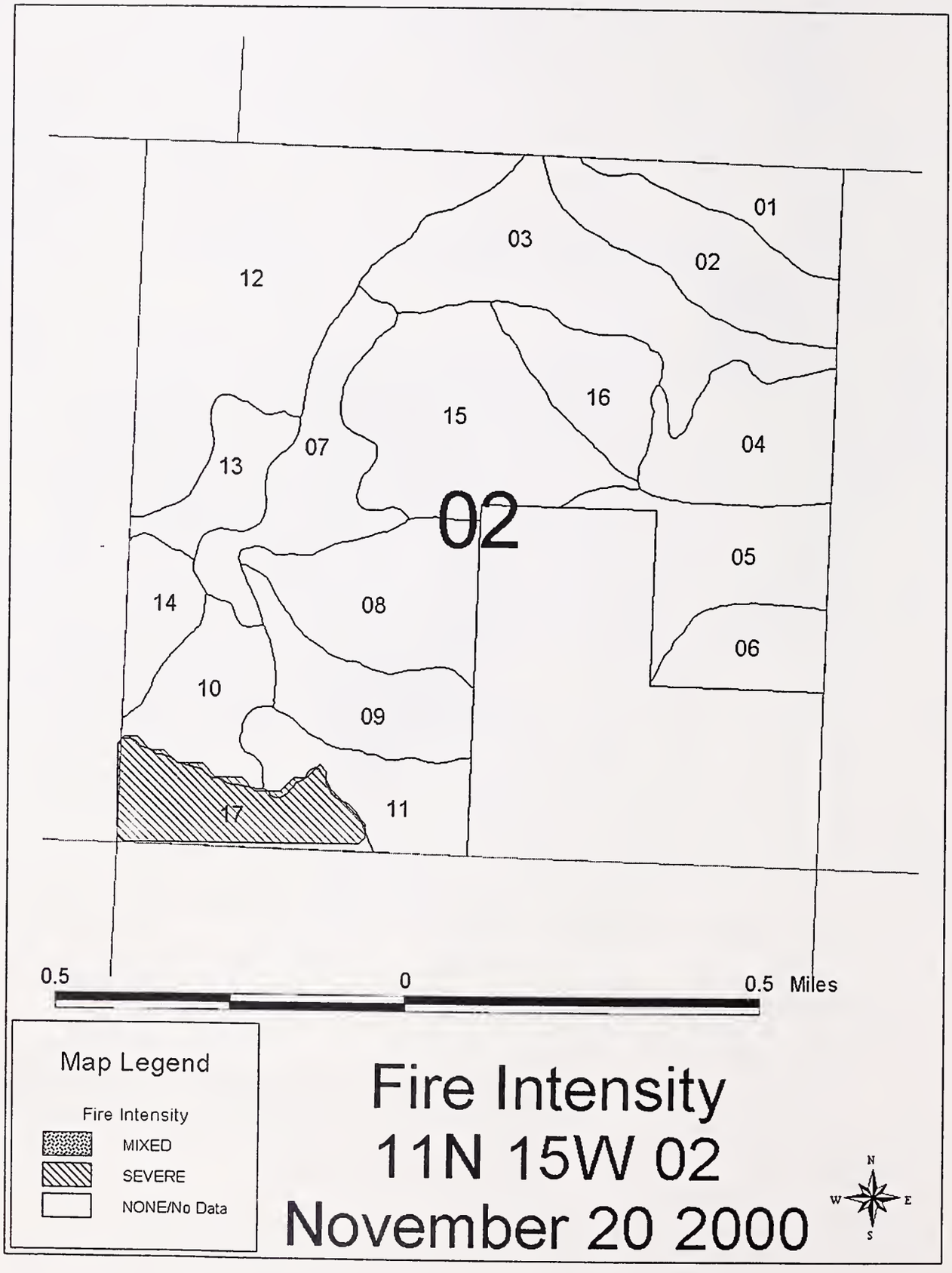
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Map Legend
Fire Intensity
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Fire Intensity
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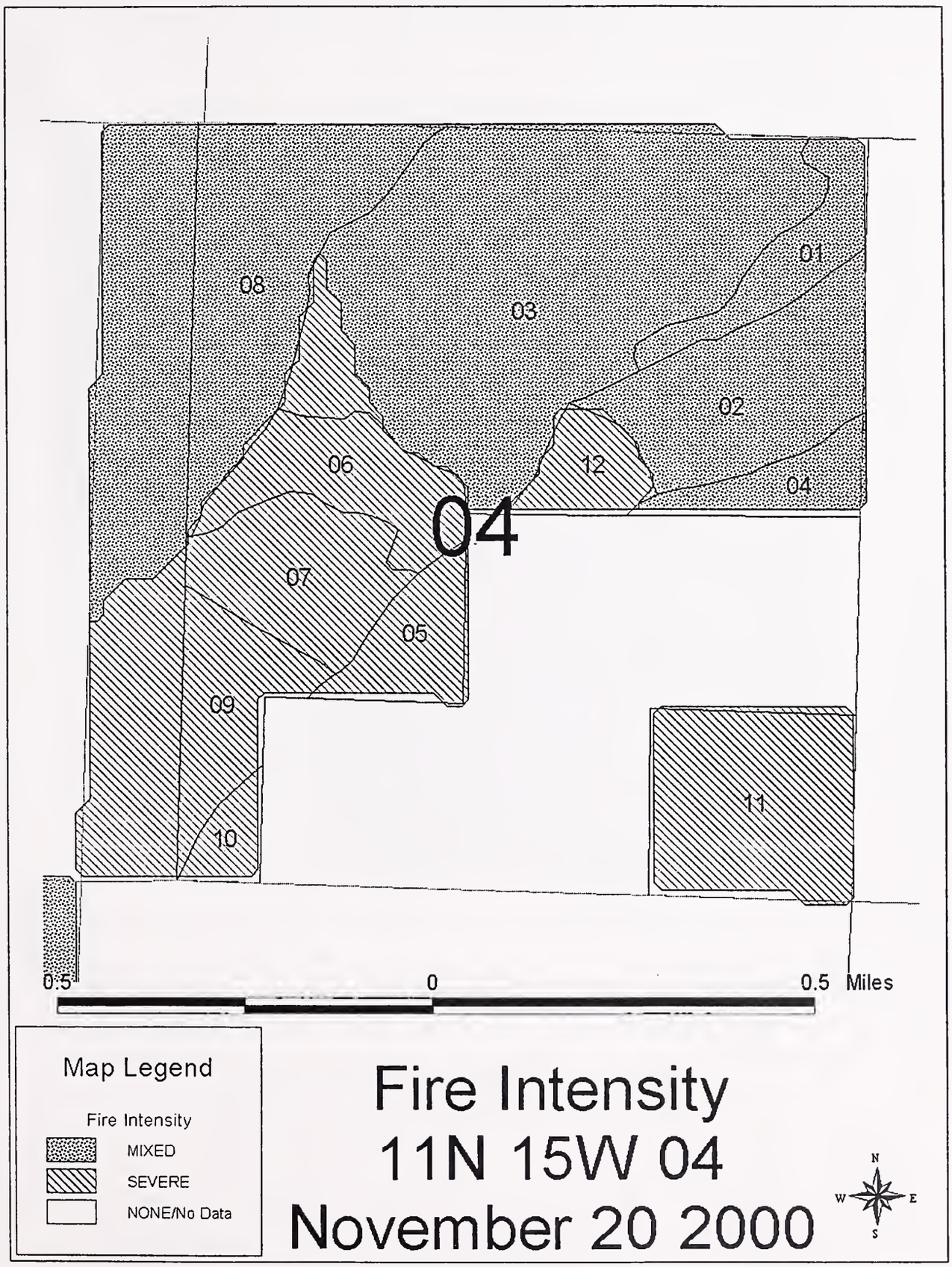
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0.5
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Map Legend
Fire Intensity
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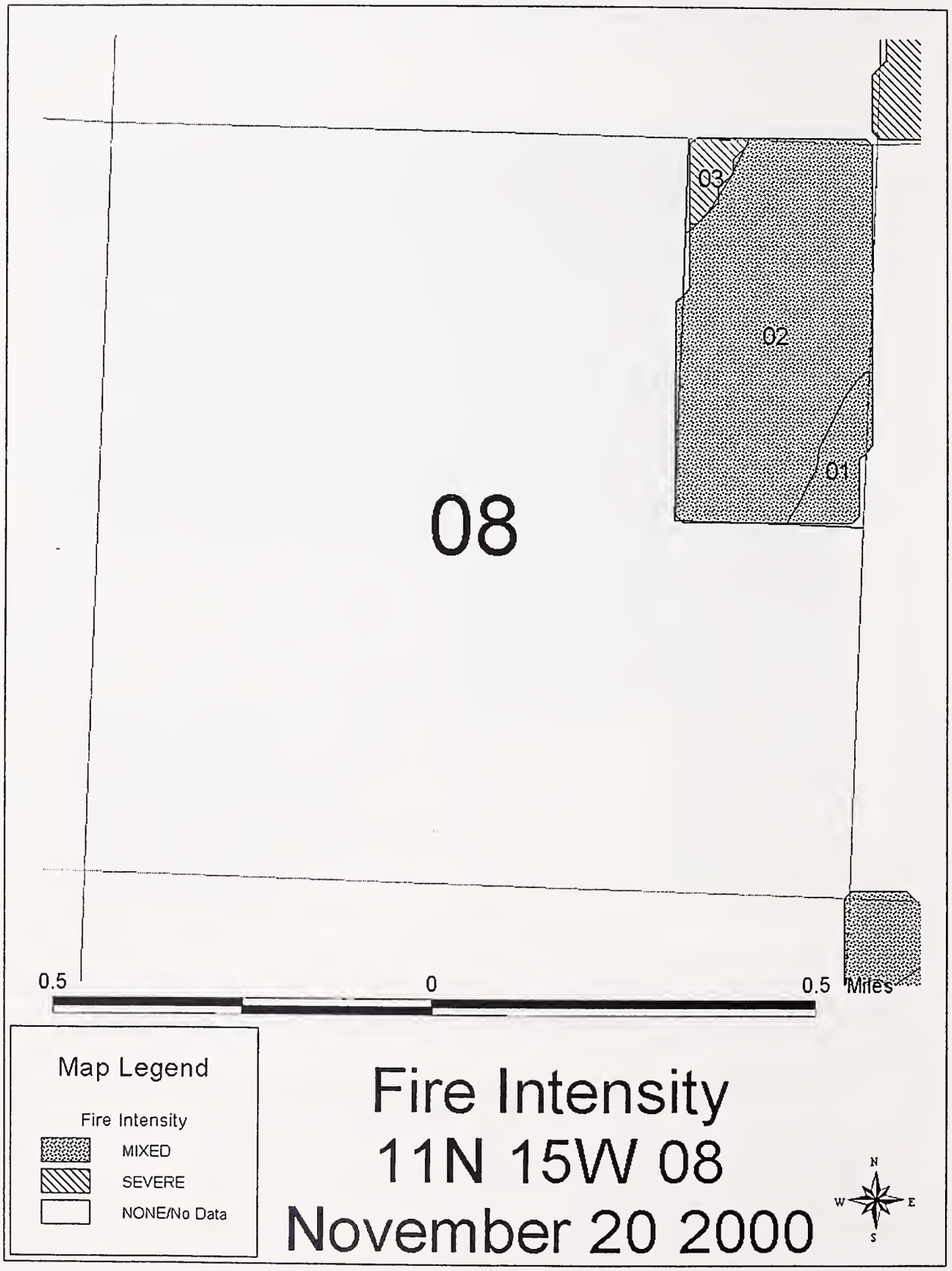
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Map Legend
Fire Intensity
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SEVERE
NONE/No Data
Fire Intensity
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November 20 2000
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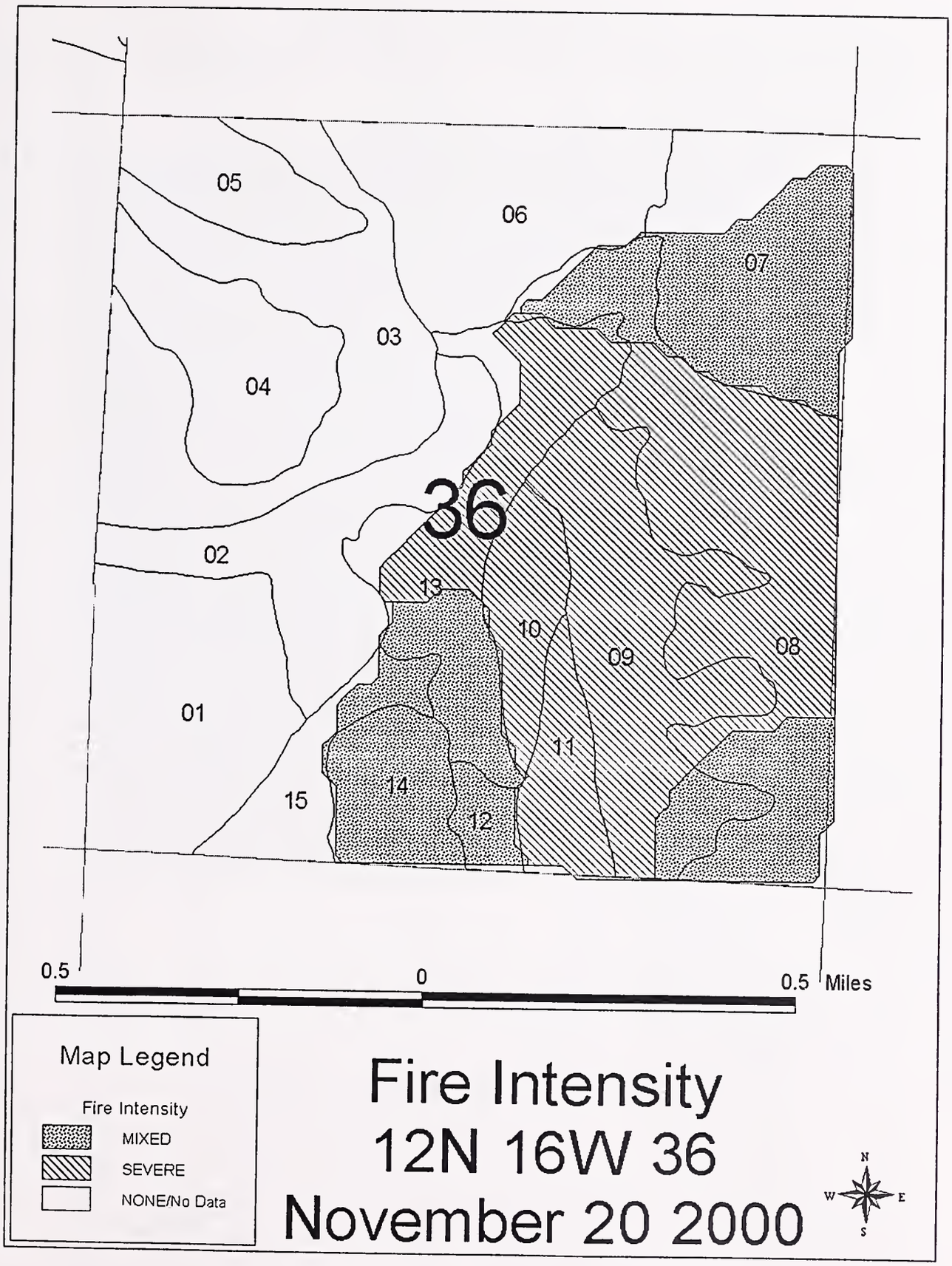
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Map Legend
Fire Intensity
MIXED
SEVERE
NONE/No Data
Fire Intensity
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November 20 2000
N
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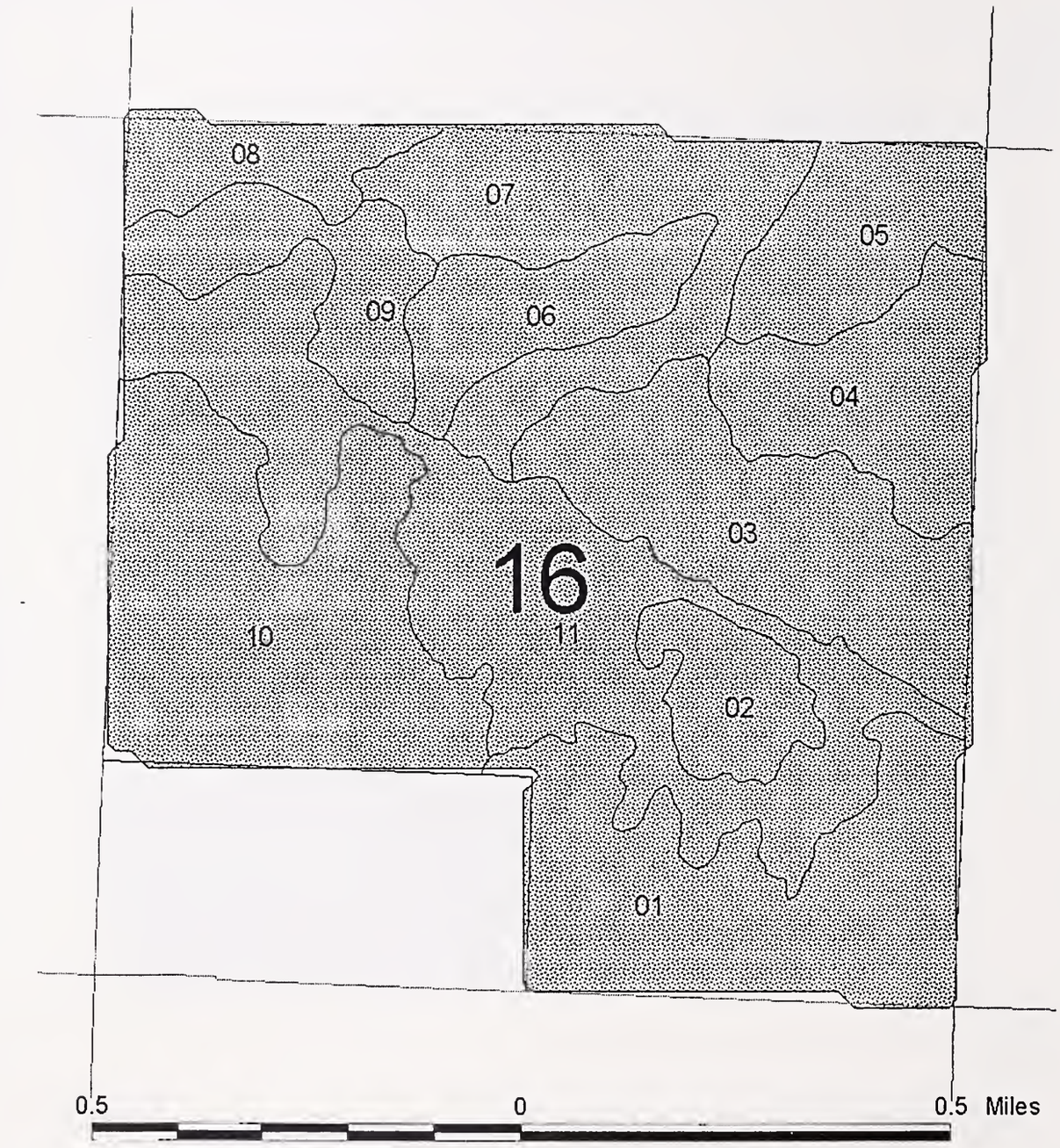


Map Legend

Fire Intensity

MIXED

SEVERE

NONE/No Data

# Fire Intensity
# 11N 15W 16
# November 20 2000

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## RYAN GULCH FIRE EFFECTS 2000

| TOWN | RANGE | SECTION | STAND | ACRES | VOL/AC | APP-COV | AGE-CLASS | FIRE EFF | HARVEST |
|---|---|---|---|---|---|---|---|---|---|
| 110N | 150W | 2 | 17 | 22.8 | 1 | DF | 100-OLD GROWTH | SR | |
| 110N | 150W | 4 | 1 | 13.2 | 13 | DF | OLD GROWTH | MS | |
| 110N | 150W | 4 | 2 | 31.5 | 0 | PP | 000-039 | MS | |
| 110N | 150W | 4 | 3 | 127.9 | 0 | PP | 000-039 | MS | |
| 110N | 150W | 4 | 4 | 11.1 | 3 | DF | 040-099 | MS | |
| 110N | 150W | 4 | 5 | 12.1 | 3 | PP | 100-OLD GROWTH | SR | |
| 110N | 150W | 4 | 6 | 21.5 | 2 | DF | 040-099 | SR | |
| 110N | 150W | 4 | 7 | 27.5 | 0 | PP | 000-039 | SR | |
| 110N | 150W | 4 | 8 | 105.7 | 2 | PP | 100-OLD GROWTH | MS | |
| 110N | 150W | 4 | 9 | 55.0 | 7 | DF | OLD GROWTH | SR | |
| 110N | 150W | 4 | 10 | 7.1 | 2 | PP | 100-OLD GROWTH | SR | |
| 110N | 150W | 4 | 11 | 39.4 | 5 | DF | 040-099 | SR | 34 |
| 110N | 150W | 4 | 12 | 10.9 | 3 | PP | 040-099 | SR | |
| 110N | 150W | 4 | 50 | 16.8 | 0 | ROAD | | | |
| 110N | 150W | 8 | 1 | 5.9 | 2 | PP | 100-OLD GROWTH | MS | |
| 110N | 150W | 8 | 2 | 70.1 | 12 | PP | OLD GROWTH | MS | |
| 110N | 150W | 8 | 3 | 3.1 | 3 | PP | 100-OLD GROWTH | SR | |
| 110N | 150W | 8 | 50 | 0.9 | 0 | ROAD | | | |
| 110N | 150W | 16 | 1 | 78.7 | 9 | PP | 100-OLD GROWTH | MS | |
| 110N | 150W | 16 | 2 | 19.1 | 9 | PP | 100-OLD GROWTH | MS | 12 |
| 110N | 150W | 16 | 3 | 63.4 | 5 | PP | 100-OLD GROWTH | MS | |
| 110N | 150W | 16 | 4 | 39.3 | 2 | PP | 100-OLD GROWTH | MS | |
| 110N | 150W | 16 | 5 | 29.8 | 4 | PP | 040-099 | MS | |
| 110N | 150W | 16 | 6 | 25.9 | 1 | PP | 040-099 | MS | |
| 110N | 150W | 16 | 7 | 55.5 | 5 | PP | 100-OLD GROWTH | MS | |
| 110N | 150W | 16 | 8 | 18.4 | 9 | PP | 100-OLD GROWTH | MS | |
| 110N | 150W | 16 | 9 | 27.3 | 6 | PP | 100-OLD GROWTH | MS | |
| 110N | 150W | 16 | 10 | 89.7 | 6 | PP | 100-OLD GROWTH | MS | |
| 110N | 150W | 16 | 11 | 111.1 | 0 | NONFOR | | | |
| 110N | 150W | 16 | 50 | 1.8 | 0 | ROAD | | | |
| 120N | 160W | 36 | 1 | 58.0 | 16 | PP | 100-OLD GROWTH | NONE | |
| 120N | 160W | 36 | 2 | 44.0 | 11 | PP | 040-099 | NONE | |
| 120N | 160W | 36 | 3 | 71.6 | 14 | PP | OLD GROWTH | NONE | |
| 120N | 160W | 36 | 4 | 38.0 | 16 | PP | OLD GROWTH | NONE | |
| 120N | 160W | 36 | 5 | 21.2 | 13 | DF | 100-OLD GROWTH | NONE | |
| 120N | 160W | 36 | 6 | 53.9 | 13 | DF | 100-OLD GROWTH | NONE | |
| 120N | 160W | 36 | 7 | 55.5 | 16 | WL/DF | 100-OLD GROWTH | MS | 32 |
| 120N | 160W | 36 | 8 | 96.0 | 6 | PP | 100-OLD GROWTH | SR/MS | 67 |
| 120N | 160W | 36 | 9 | 61.4 | 12 | PP | 100-OLD GROWTH | SR/MS | 55 |
| 120N | 160W | 36 | 10 | 17.1 | 14 | PP | 100-OLD GROWTH | SR | |
| 120N | 160W | 36 | 11 | 17.3 | 14 | PP | 100-OLD GROWTH | SR | |
| 120N | 160W | 36 | 12 | 7.0 | 9 | PP | 100-OLD GROWTH | MS | |
| 120N | 160W | 36 | 13 | 50.9 | 5 | PP | 100-OLD GROWTH | SR/MS | |
| 120N | 160W | 36 | 14 | 22.1 | 9 | PP | 100-OLD GROWTH | MS | |
| 120N | 160W | 36 | 15 | 18.6 | 14 | PP | 100-OLD GROWTH | NO/MS | |
| 120N | 160W | 36 | 50 | 7.4 | 0 | ROAD | | | |

APP-COV- Appropriate Cover Type

Age-Class refers to pre-fire age class. Age class, post fire for stand replacement is zero.

SR- Stand replacement. MS- Mixed severity.

SR/MS-The predominant fire effect was stand replacement, with some acres of mixed severity.

NO/MS-The predominant fire effect was none, with some acres mixed severity.

Source- Stand Level Inventory-1989-Sections 2,4 -1990

| Ryan Gulch Post Fire 2000 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| section | stand | SR | SR | MS | MS | Harvest | Harvest | Roads |
| | | merch | non merch | merch | non merch | SR | MS | |
| 36 | 7 | | | 32 | | | 32 | 7.4 |
| | 8 | 67 | | 19 | 10 | 67 | | |
| | 9 | 55 | | 6 | | 55 | | |
| | 14 | | | 22 | | | | |
| | 15 | | | 6 | | | | |
| | 12 | | | 7 | | | | |
| | 13 | | 33 | 14 | 4 | | | |
| | 10,11 | | 35 | | | | | |
| 2 | 17 | | 23 | | | | | 0.7 |
| 4 | 1 | | | 13 | | | | 16.8 |
| | 2 | | | | 31 | | | |
| | 3 | | | | 128 | | | |
| | 4 | | | 11 | | | | |
| | 5 | 12 | | | | | | |
| | 6 | | 21 | | | | | |
| | 7 | | 27 | | | | | |
| | 8 | | | | 106 | | | |
| | 9 | 55 | | | | | | |
| | 10 | | 7 | | | | | |
| | 12 | 11 | | | | | | |
| | 11 | 39 | | | | 34 | | |
| 8 | | | | 80 | | | | 0.9 |
| 16 | 4 | | | | 39 | | | 1.8 |
| | 6 | | | | 26 | | | |
| | 11 | | | | 111 | | | |
| | all other stands | | | 382 | | | 12 | |
| TOTAL ACRES | | 239 | 146 | 592 | 455 | 156 | 44 | 27.6 |
| % of TOTAL | | 17% | 10% | 41% | 32% | 11% | 3% | |
| TOTAL BURN AC. | | 1432 | | | | | | |
| TOT MERCH BURN | | 831 | 58% | | | | | |
| TOT NON-MERCH | | 601 | 42% | | | | | |
| 20% TOTAL | | 286.4 | | | | | | |
| 20% MERCH | | 166.2 | | | | | | |
| 20% NON-MERCH | | 120.2 | | | | | | |
| | | | | | | | | |
| Merchantable Stand Replacement we would not enter | | | | | | | | |
| 4 | 9 | 55 | | | | | | |
| | 5 | 12 | | | | | | |
| | 12 | 11 | | | | | | |
| | 11 | 5 | | | | | | |
| Total | | 83 | 10% | of Merch.Burn | | | | |
| | | | | | | | | |
| % Burn Harvested | | 14% | | | | | | |
| % Merch Harvested | | 24% | | | | | | |
| | | | | | | | | |
| SR-Stand replacement fire effects (acres) | | | | | | | | |
| MS-Mixed severity fire effects (acres) | | | | | | | | |
| Merch-Stands containing a minimum of 3000 bd.ft./acre | | | | | | | | |

# RYAN GULCH FIRE REHABILITATION PLAN FOR SUPPRESSION RELATED ACTIVITIES

# RYAN GULCH
# Rehabilitation Plan

August 21, 2000

Goals and Objectives:

- < Prevent soil loss on all fire lines and fire suppression related disturbances.
- < Prevent degradation of water quality due to suppression related activities.
- < Correct impacts to facilities and grounds used for ICP, Incident Base, Helibase and other installations.

General:

Remove all equipment, flagging and trash from the fire line area and other areas occupied in the course of the fire suppression activities.

## STATE, PLUM CREEK, I-P LANDS

Dozer Constructed Fire Lines

Waterbar or recontour dozer lines. Recontour where original ground shape can be restored by back-blading with a dozer or excavator using a reasonable amount of effort (1-2 passes). Waterbar other dozer constructed lines and roads by applying the following standards as appropriate to meet State BMP's.

- o The waterbar should be no more than two (2) feet in total height from the bottom of the dip to the top of the waterbar. That is dig down no more than 12 inches and pile dirt no higher than 18 inches above the surface.
- o Angle the waterbars down hill so the low edge is on the outside.
- o Angle waterbars 15 to 45 degrees. The lower the slope the greater the angle.
- o Where possible position waterbars so water will drain into rocky areas or areas with heavy vegetation. However, do not exceed prescribed intervals to place waterbars in ideal locations.
- o Open the waterbars on the downhill end with a lead out. Minimize the lead out. Make sure that water can flow out the end of the dip.

Waterbar Spacing:

- X Slope of 10% or less - interval of 200 to 300 feet.
- X Slope of 11% to 25% - interval of 100 to 200 feet.
- X Slope of 26% to 49% - interval of 50 to 100 feet.
- X Slope of 50% or greater – interval of 30 to 100 feet.

Seed Mix

The following seed will be ordered based on Pure Live Seed. Seed will be Certified Noxious Weed Seed Free. Seeding will be accomplished in the fall before winter rains and snows. There are an estimated 958 acres of roads, dozer lines and hand lines to be seeded.

< Annual Rye grass, Lolium multiflorum seeded at a rate of 12 lbs per acre = 11,500 lbs
< Pubescent wheatgrass, Elytrigia intermedia at a rate of 10 lbs per acre = 9,600 lbs
< "Darar" or "Whitmar" hard fescue, Festuca duriscala at a rate of 3 lbs per acre = 2,875 lbs
< Dutch white clover at a rate of 2 lbs per acre = 1,920 lbs

Handlines

- Waterbar handlines using the spacing specified above.

Stream and Draw Crossings

- Remove soil and vegetation debris that may have been introduced to remove to a point above the high water mark and place where it will not be eroded into the stream.

Clinton VFD Station, Beavertail Hill State Park, Helibase, Helispots

- Clean and restore these areas to the satisfaction of the jurisdictional agency or property owner. See appendices for specific work activities to be accomplished.

Noxious Weed Control

- There is knapweed (a noxious weed) throughout the fire area. In order to not spread weeds to the next fire, crews should, upon demob, take care to clean their equipment and personnel gear of all plant parts and seed. Ground support is to provide wash area.

Road Maintenance

- Maintain roads that are to remain open to traffic and that were used during fire suppression to, at least, then pre-fire condition. That includes drainage system restoration, culvert maintenance, culvert replacement (where damaged by fire equipment), other roads, surface blading and seeding. The enclosed map shows the roads to be maintained. Other roads used during fire suppression shall be shaped to drain, water barred and seeded.

BLM LANDS

Ten Mile Power Line/Fire Line Rehabilitation

Noxious Weed Control

Spotted knapweed was common in places under the powerline, other noxious weeds are likely to be present as well. There is a good chance that weed control will be needed on disturbed sites in the fall of 2001 or the spring of 2002 to minimize establishment of knapweed and other noxious plants in the disturbed soils. Picloram (Tordon) is a chemical well suited to for this purpose provided it is applied on uplands and riparian/aquatic areas are avoided. 2,4-d formulated for aquatic use (and Krenite for leafy spurge) are the preferred herbicides for areas where picloram cannot be used.

-picloram should be applied @ ½ lb/acre (equivalent to one quart/acre) rate or less depending on weed species. Current price for picloram is about $80.00 per gallon. Approx 2.5 gallons will be needed to treat public lands.

-Krenite should be applied @6 lbs (equivalent to 1.5 gallons/acre) rate for leafy spurge control in riparian/aquatic areas or where water tables are elevated. One gallon will be needed.

BLM will purchase, store and apply these materials.

In-Stream Disturbances

Where skidder crossed the Ten Mile channel there is now an accumulation of slash, mineral soil and organic soil material. This is not seen as a serious problem in terms of water quality or aquatic habitat and should be left as is. Adding additional small amounts of slash to the stream channel as part of the skidding operations will help filter sediment and will be beneficial.

PRIVATE LANDS

Generally employ measures described under State and private land on firelines. Accomplish reasonable additional measures requested by property owners to correct impacts to their lands resulting from suppression actions.

Weston Gulch needs special consideration. Winch any down trees out of the streamside management zone (SMZ). Reshape disturbed channel banks with an excavator to near original ground line. On creek edge sites, grass seed disturbed soils, install straw mulch blanket (one roll 6' x 500') and redistribute available slash. Grade road as needed and install water bars where the water will filter into areas away from the creek and install slash at the outlets.

**Ryan Gulch Fire Rehabilitation Plan for Suppression Related activities 8/21/00**

J.Collins

This report includes a summary discussion of the fire area and effects, general rehabilitation recommendations and some site-specific recommendations.
The Ryan Gulch fire encompasses about 17,118 acres 8/19/00 of forest and rangeland. At the start, the fire spread rapidly up the steep Ryan Creek Canyon causing a crown fire that resulted in severe burn conditions on about 1/3 of the Ryan Creek drainage. Severe burn conditions also occurred in the Marcella Creek, Dry Creek and unnamed ephemeral drainages, but were less extensive and mostly part of a mosaic burn. A watershed emergency has not been established considering average precipitation and runoff conditions.

**Geology/soils** The terrain is moderate to very steep mountain sideslopes with some abrupt slope breaks and deeply incised draws that reflect the structural bedrock control of the landscapes. Bedrock is mainly stable, Precambrian belt argillites, limestones and quartzites that are well fractured at depth, and form mostly gravelly skeletal soils. The limestone soils have some finer textured subsoils. Scree slope and rock outcrops are common on steeper slopes. Soils are mainly rapidly drained, and erosion potential is moderate to high. Subsoils exposed by dozer fire lines can be generally reclaimed by pulling berms back into fire lines, installing waterbars and reseeding.

There are extensive existing logging roads in the area, which were used, where feasible for fire lines and tied together with dozer lines. Most roads were not rutted or affected, due to the resilient nature of these rocky soils. Some dozer line is on steep slopes, mainly on rocky sites. There are considerable interior dozer lines, constructed as the fire front advanced. There are several powerlines, a fiberoptic cable, and gas pipeline within the fire area that were of great concern for protection during suppression activities.

**Cramer Creek** is a 17,067-acre watershed, which receives approximately 20 inches of annual precipitation. This third order stream is intercepted by irrigation ditches and ultimately a pond near its confluence with the Clark Fork River. During seasonally high flows, it is expected that surface waters from Cramer Creek reach the Clark Fork River. Cramer Creek is a Class I perennial stream according to the Montana Streamside Management Zone (SMZ) Law and Rules. Population data sampled by the Bureau of Land Management in the early 1980's indicate that West slope cutthroat, rainbow and eastern brook trout are present in the mainstem of Cramer Creek. Fire was limited to some spots along the creek in the N1/2 of Section 30,T12N, R15W and the ridge that forms the watershed divide in the Southeast portion of the drainage. One dozer line, about 30 feet wide, intercepts the Cramer creek road on a steep slope that is at risk for erosion and sedimentation. Reshaping with an excavator can stabilize this site. Steve Hayes of Plum Creek has a hydrology background and has approved of the site reclamation.

**Ryan Creek** is perennial in the headwaters and dry in the midsection currently where a dry pond occurs, about 30 feet deep and over 5 acres in area with an 18" CMP outlet. The lower portion of the drainage is perennial flowing through a field by the Wills property, into several irrigation ponds and then into the Clark Fork River. About 1/3 of Ryan Creek was severe burned and will be subject to flashy flows depending on fall rains and spring runoff. Soils in the drainage are very rocky, and the creek bottom appears stable but is denuded and will take some time to revegetate. Jeff Collins and George Hershenberger reviewed part of the severe burn area and their initial impression

is that watershed restoration efforts of grass seeding would have limited benefit in an average runoff year. We contacted Tim Weirsum, NRCS and asked that he arrange to have the site and dam evaluated for retention capacity and stability.

**Ten Mile Creek** flows during runoff, is perennial in the headwaters and is currently dry near the confluence with Bear Creek. There was about 50-100feet of clearing along the powerline R/W in a preventative effort to protect the line, a fiberoptic cable on top of the towers and stop the fires advance towards the Garnet historic ghost town. No burning occurred along the Ten-mile creek banks. The clearing involved felling trees with a fellar-buncher harvester along the creek bottom and on some short steep slopes and dozer line construction. The creek bottom was crossed with equipment in many locations, and some spots have bare soil. Soils in the Ten-mile drainage tend to be deeper, fine textured silt loams and gravelly clay loams. Several hydrologists have reviewed the sites, (description attached) and the consensus is that disturbed soils can be stabilized by reshaping, grass seeding and distributing slash on some sites of bare soil near creek. There is not a fishery concern, based on the BLM fisheries biologist review (see BLM note). Plum Creek timberlands are the largest landowner followed by, Louisiana Pacific, BLM and small private lands.
**Recommendations** Any trees in SMZ should be winched out.
Disturbed channel banks should be reshaped with an excavator.
Grass seed disturbed soils and redistribute available slash on creek edge sites.
Grade roads where heavy use occurred

**Ten Mile Road site notes referenced to map**

1) SW1/2 Section 24 T12N, R15W Existing road rough but improved over existing and not feasible to grade.

2) McKay property- Dozer crossing of Ten-mile creek caused rutting in streambed mud. Reshape banks with excavator, grass seed, and distribute slash along channel banks.

3) Private property- short steep slopes above creek under powerline about 100-foot width. Considerable bare soil exposed and erosive. Install water-bars on slope (about 3) grass seed and distribute available slash on soils surface. Reshape stream channel banks where disturbed at sites 3,4, & 5.

6) Existing road stream crossing. Install drain-dips on road prior to crossing to re-establish surface drainage.

7) Road edge on creek has soil material sidecast into creek. On locations flagged in field, reshape channel edge and install (2) separate erosion dams constructed of 40 foot segments of straw bales, (end to end) rolled in filter fabric and staked down with rebar to the ground (straw burritos).

8) Road edge on creek has soil material sidecast into creek similar to above. On location flagged in field, reshape channel edge and install (1) erosion dams constructed of 80-foot segments of straw bales wrapped in filter fabric and staked to the ground with re-bar.

**Weston Gulch** has about ¼ mile of perennial flow but is dry near its outlet and is not a fishery. There is considerable dozer line construction and disturbance in the draw. A road along the creek was widened by dozers and soil and brush was deposited in the creek. The silt loam soils at this site are more dry powder and erosive than other soils in the area. I discussed my recommendations with Ben Weston, landowner and Steve Hayes, which agreed with this plan.
**Recommendations** Any trees in SMZ should be winched out.
Disturbed channel banks should be reshaped with an excavator to near original ground line. On creek edge sites, grass seed disturbed soils, install a straw mulch blanket (SC150 or equivalent) and redistribute available slash.
Grade roads where heavy use occurred and install waterbars as noted on map. Locate waterbars into filter areas away from creek and install slash on outlets.

# ECONOMICS REPORT

# Economics-Ryan Gulch Salvage Timber Sale

The estimated total timber harvest volume for the proposed action is 0.6 million board feet (600 MBF).

The estimated stumpage value is $119/MBF, based on comparable sales of the recent past.

The estimated stumpage value would be $71,400 (600 MBF times $119/MBF).

Collections for Forest Improvements would be an additional $21,000 (600 MBF times $35/MBF). These monies are used to fund activities such as planting, slash disposal, thinning, and weed control.

The total estimated revenue generated (the sum of stumpage value and collections for Forest Improvements) would be approximately $90,000.

Costs related to administration of the timber sale program are tracked only at the regional and statewide levels. DNRC does not track project-level costs for individual timber sales.

Table 3 shows regional and statewide revenue-to-cost ratios for recent fiscal years.

TABLE 3- THE NET REVENUE/COST RATIOS (TIMBER SALE ACCOUNTING SUMMARY - MEMO FY95 FY96, FY97, FY98, FY99 & FY00)

Total Revenue/Total Cost Ratio*

| FISCAL YEAR: | FY95 | FY96 | FY97 | FY98 | FY99 | FY00 |
|---|---|---|---|---|---|---|
| Southwestern Land Office | 1.24 | 2.30 | 2.08 | 1.83 | 1.44 | 2.36 |
| Total State Timber Sale Program | 2.78 | 2.07 | 1.68 | 1.89 | 1.72 | 1.36 |

** Total revenue is revenue from timber sales, permits, Forest Improvement, and road maintenance, and total cost is the sum of timber operating and general administration costs.*

Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives, they are not intended to be used as absolute estimates of return.

# ARCHAEOLOGY REPORT

## Stocker, Rich

**From:** Rennie, Patrick
**Sent:** Monday, October 30, 2000 2:21 PM
**To:** Stocker, Rich
**Subject:** RE: Status Check-In Meeting

Rich:

I have consulted with the Montana State Historic Preservation Office and have reviewed internal records and topographic maps of the Ryan Gulch Salvage areas. No Heritage Properties should be impacted with proposed salvage operations. No additional cultural resource investigative work is recommended in order for the proposed project to proceed.

Patrick Rennie
DNRC Archaeologist

-----Original Message-----
**From:** Stocker, Rich
**Sent:** Monday, October 23, 2000 1:17 PM
**To:** Rennie, Patrick
**Subject:** RE: Status Check-In Meeting

Patrick,

Regarding Ryan Gulch Salvage; will you please send me documentation of your findings for cultural resources in the Ryan Gulch area. We propose to harvest, using existing roads, in section 36; T12N,R16W and SE of SE section 4, T11N, R15W and the south half of section 16, T11N,R15W. I will need this information for the project file as well as for the EA, as you well know. Thank you for your help. Rich Stocker (542-5810)

-----Original Message-----
**From:** Rennie, Patrick
**Sent:** Friday, September 22, 2000 2:59 PM
**To:** Storer, Robert
**Cc:** Chappell, Kevin; Hayes, Jon; Stocker, Rich
**Subject:** RE: Status Check-In Meeting

Bob:

I finished looking at the maps and in-house records for the Sula and Ryan Gulch Timber salvage areas. For the Sula area, there are no cultural resource sites recorded, but then again, only sections 25 and 26 (T2N R19W) have been inventoried for cultural resources. Most of the topography is sufficiently steep that the potential is low for cultural resources to exist in those areas. There are a few locales, however, that I think have a high potential for cultural resources. The locales are as follows:

1) along the creek in Section 34 (T1N R19W);
2) the E1/2 of Section 8 (T2N R19W);
3) the S1/2 of Section 9 (T2N R19W);
4) Section 15 and 16 (T2N R19W);
5) the springs in Section 21 (T2N R19W); and
6)the area surrounding Schoolmarm Lake in Section 22 (T2N R19W)

Do you know if landing zones, road construction, or timber harvesting will occur within the aforementioned areas? If those areas will see ground disturbing activities it would be a good opportunity for me to inventory those locales. If they will not be impacted with ground disturbing activities, then I will not recommend any additional inventory work for either the Sula or Ryan Gulch timber salvage areas.

Patrick Rennie
DNRC Archaeologist

Copies of this document with its appendices were published at an approximate cost of $8.89 per copy for printing and $2.23 for mailing.